Intel Core i7-980X | Danger Den Tower 12 | MSI P55-GD85

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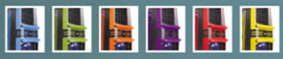

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i5-660 3.33Ghz	$ 885
i5-650 3.20Ghz	$ 865

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i3-530 2.93Ghz	$ 789

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(1066Mhz, 900Mhz, L3 Cache)	
620M 4MB 2.66Ghz	$ 1429

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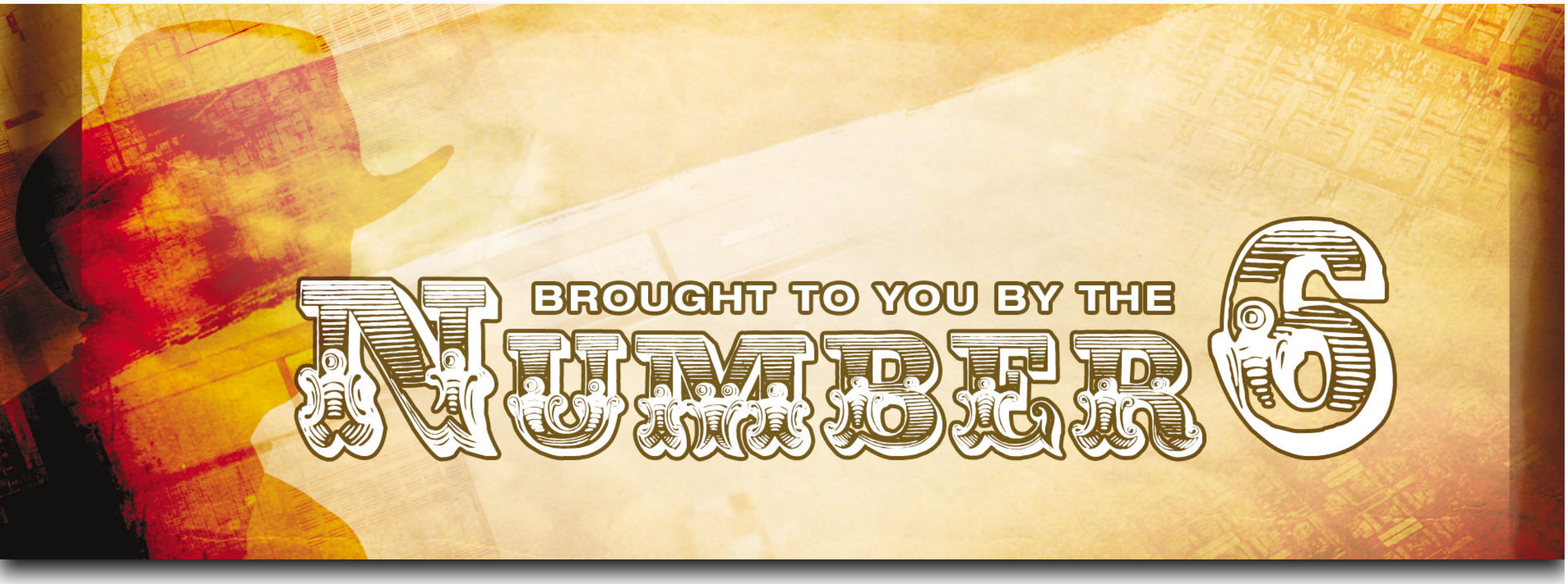
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Did you find the hidden *CPU* logo on our cover? Turn the page for the answer.

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Infinite Loop

Strange stats and other odd-ball items from computing's periphery. **pages 90, 93**

Ribbon Hero

Corrections

On page 12 of the April issue, we incorrectly cited an Internet World Stats report that 360 million people in the world had access to the Internet as of Sept. 30, 2009—25.6% of the world's population would actually be 1,733,993,741. The number we used represented people with Internet access as of Dec. 31, 2000.

EDITOR'S NOTE

We've had a busy month here at *CPU* since the last time we talked. (OK, since the last time I talked—or wrote . . . you know what I mean.) We got our grubby mitts on Intel's amazing six-core i7-980X, we traveled to several LAN events, we attended PAX East, and much more, although not necessarily in that order.

For a number of reasons, I was unable to go to PAX with our team this time, and getting calls and emails from the crew at the show was pretty rough. Remember when all your friends went to hit the midnight premiere of "The Dark Knight" and you had to work? This was kinda like that, only worse.

In retrospect, I imagine this is my karmic payback for having gloated to everyone who would listen about rolling a Worgen Druid named "ManBearWolf" in the Cataclysm demo at Blizzard's booth during the last PAX. Come to think of it, I even snapped a screenshot of that on my phone and sent it back to the office, so I probably got off easy. Still, it's not an easy pill to swallow.

On the plus side, however, things here at *CPU* HQ have been pretty interesting, too. As mentioned earlier, we have borne witness to the launch of the first enthusiast-grade six-core CPU from Intel, and even more recently we were among the first to take a crack at Fermi. We'll have more on that very soon, but in the meantime we invite you to luxuriate in the wealth of PC nerdery we've lovingly compiled for you in this issue. SSDs, USB 3.0 peripherals, Lynnfield overclocks, and a look at the winning mods from several Intel LAN Fest events are all here, just waiting for you to turn the page and discover them.

Chris Trumble, Publication Editor, *CPU*

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What's Happening • Hardware

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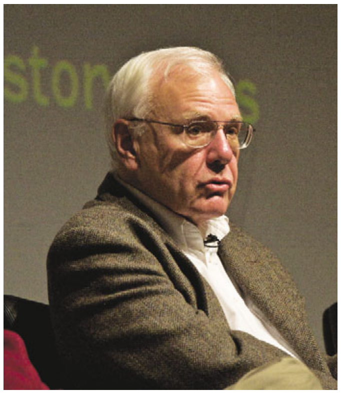
The "Nobel Prize In Computing" Goes To . . .



We have a lot to thank Microsoft Technical Fellow Chuck Thacker for, including his efforts while at Xerox PARC at bringing life to 1974's Alto, the first modern computer. Thacker also co-invented Ethernet and designed the first Tablet PC prototypes. In June, the Association for Computing Machinery will honor Thacker for such lifetime achievements as the 2009 winner of the prestigious A.M. Turing Award, which carries a $250,000 prize. "You have to understand that I've never thought that I would get the Turing award because the last time the Turing award was awarded to someone who built computers as their primary work, that was over 40 years," the Seattle Times quotes Thacker, who is recognized as designing the first multiprocessor workstation. "It's usually awarded to either software folks or theoreticians. And I'm not either." ▲

WD Enters The SSD Fray

Add Western Digital to the list of hard drive makers now with a hat in the SSD ring. In early March WD released the SiliconEdge Blue, a 2.5-incher in 64GB ($279), 128GB ($529), and 256GB sizes ($999) with 250MBps read and 170MBps write speeds. OCZ and Intel, meanwhile, also released new SSDs recently that hover around the $100 mark. OCZ's "budget" 32GB Onyx will reportedly run less than $100 and is billed as delivering "reliable performance without the high price normally associated with SSD[s]." Intel's 40GB X25-V Value SATA SSD ($125) is touted as being "aimed at value segment netbooks and dual-drive/boot drive desktop set-ups to offer users the performance and reliability advantages of solid-state computing at an affordable, entry-level price." ▲

Gulftown Makes The Scene

Intel's 3D graphics-devouring 6-core Gulftown chip has arrived, and the options of systems now available incorporating the CPU are many. Digital Storm, for example, is taking configurations for its Black/OPS rig packed with a Core i7-980X Extreme Edition (base price starts at $5,642). Digital Storm's Rajeev Kuruppu says, "With our TwisterBoost overclocking package, we can overclock the i7-980X to a record breaking 4.4GHz." Velocity Micro's upgradeable Edge Z55, meanwhile, starts at $2,825, while the Raptor Lx665 and Lx775 run for $3,599 and $4,799, respectively. Other Gulftown choices include iBuyPower Paladin ($2,159 and up) with Power Drive Overclocking Service that "overclocks the CPU by as much as 30%," Maingear's Shift series ($1,799 base), and Falcon Northwest's Mach V ($3,406.01 and up) and FragBox ($3,106.95 and up). ▲

The Commodore Sees A New Day

It's not exactly your daddy's Commodore 64 circa 1982, but a reincarnation of the classic and beloved system of yesteryear will soon be available in the form of an all-in-one keyboard rig (17.5 x 2 inches) from Commodore USA. The company is licensing the brand name from Commodore Gaming, and its system is expected for a June release at a still undisclosed price in black and white options. The system features four USB 2.0 ports, DVI and RGB ports, DVD burner, up to 2TB storage, up to 4GB DDR RAM, Intel GMA 3100 graphics, Intel Core 2 Duo or Core Quad processor, and "any OS you choose" other than Mac OS X Snow Leopard, which you can install yourself. ▲

HARDWARE MOLE

PC Market Comes Out Swinging

Ding. Ding. Ding. If the PC market was a boxer, the pugilist picked itself up off the mat in 2009 and is looking to go "Rocky" in 2010. At least that's the summation one can draw from recent IDC data stating that despite a "severely constrained first half" in 2009, the PC market rebounded in the second half due to heavily discounted PCs and an improved economy. For all of 2009, IDC says the worldwide market grew 2.9%. Portable PC shipments led the charge with 18.4% growth vs. 2008. Better, IDC expects the upward trend to continue this year at a 12.6% clip. By 2012, IDC predicts portables will represent 70% of all PCs shipments. On the downside, IDC predicts revenues won't surpass 2008's record levels until 2012 and will need shipments totaling "140 million units higher than the 2008 market." ▲

One Steely Keyboard

The fact that SteelSeries' new 6Gv2 gaming keyboard ($99.99) has 18-karat gold-plated mechanical switches might get some gamers to take notice. The fact that the board has a life cycle (50 million keystrokes) that is about 10 times longer than conventional keyboards might get some lookers to actually buy it. SteelSeries says the board's gaming-specific buffer system supports as many key combos as the board has keys. You can also expect anti-ghosting support in FPSers "to move, crouch, aim, fire, and even check the scoreboard, simultaneously." SteelSeries CEO Bruce Hawver states that after watching pro gaming teams win tourneys with its 7G "as their weapon of choice," the company maintained that board's "rock star mentality" with the 6Gv2 but slimmed things down without sacrificing any response time, durability, or performance. ▲

Pogoplug Puts A Bounce In Streaming

OK, so CloudEngines' Pogoplug ($129) "connects your USB drive to the Internet so that you can easily share and access your files from anywhere." Why should you care? Because as of mid-March, a software update also lets owners "access, share, and stream their media directly to their Xbox 360 or PS3 from any local or remotely located Pogoplug." Want to show your pals what they missed at 2009's QuakeCon via photo galleries on an external drive? To paraphrase CloudEngines, you can do so without ever putting down your game controller. You can also back up folders from a system to a Pogoplug-connected drive via Active Copy software. ▲

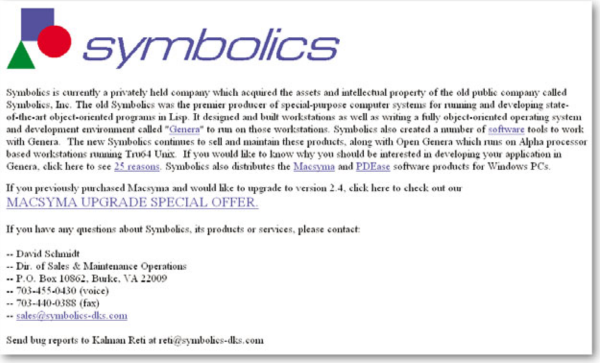
Compiled by Blaine Flamig

A Question Of Rights

Seemingly any time someone utters "fundamental rights" in a group of diverse individuals, an argument ensues. We can't imagine a recent poll BBC World Service conducted of 27,000 adults from 26 countries asking if the Internet is such a right as being any different. For the record, four out of five adults agreed the Internet should be. Taking the pro side was the International Telecommunication Union's Dr. Hamadoun Toure, who told the BBC "the Internet is the most powerful potential source of enlightenment ever created" and governments should regard it "as basic infrastructure—just like roads, waste, and water." Also debate-worthy is whether governments anywhere should ever regulate the Internet. More than half of those polled said no. ▲

An Anniversary We Can All Appreciate

If you weren't in full-blown celebration mode March 15, that's a shame. Anyone and everyone now using this crazy thing we call the Internet should have been, as the day marked the Silver Anniversary of the first dot com's registration. According to Mashable, it was the now-defunct computer maker Symbolics that holds the honor. Today, an astounding 668,000 dot com sites are registered per month. The BBC states that from 2000 to 2010, 57 million domain names were registered and 1.7 billion people, or roughly one-quarter the world's population, now use the Internet. In monetary terms, by 2020, the BBC reports that the Internet will pump $3.8 trillion into the global economy, more than Germany's GNP. ▲



Symbolics is currently a privately held company which acquired the assets and intellectual property of the old public company called Symbolics, Inc. The old Symbolics was the premier producer of special-purpose computer systems for running and developing state-of-the-art object-oriented programs in Lisp. It designed and built workstations as well as writing a fully object-oriented operating system and development environment called "Genera" to run on those workstations. Symbolics also created a number of software tools to work with Genera. The new Symbolics continues to sell and maintain these products, along with Open Genera which runs on Alpha processor based workstations running Tru64 Unix. If you would like to know why you should be interested in developing your application in Genera, click here to see 25 reasons. Symbolics also distributes the Macsyma and PDEase software products for Windows PCs.

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Internet Giving Way To More Hate

We can thank Twitter, Facebook, YouTube, and other social networking sites for the increase of hate groups showing up online, the Simon Wiesenthal Center states in a recent study it conducted on the subject. The group depicts examples of the violence, anti-Semitism, homophobia, music, and more it unearthed in a disturbing 63-page PDF. Overall, usage of social networking sites by hate and militant groups has increased by roughly 20% in the last 12 months, the group states, with more than 11,500 social networks, Web sites, blogs, and forums containing such material. Rabbi Abraham Cooper, associate dean at the center, told Reuters, "the numbers are probably, at the end of the day, multiples of that." ▲

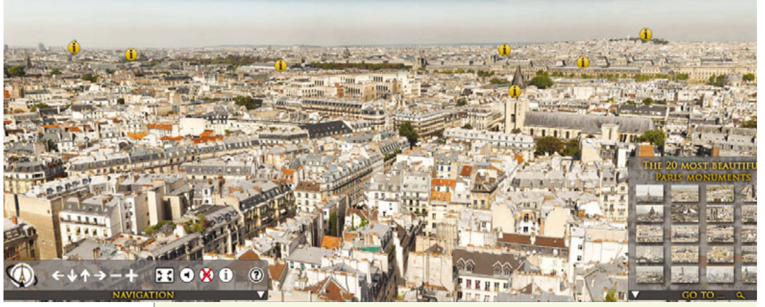
SITE SEEING

C-SPAN Gets Its Archive On

You say you're a political junkie? You schedule entire days around White House press hearings? Congressional debates are music to your ears? Well, say hello to the C-SPAN Video Library where "every C-SPAN program aired since 1987" is now for the viewing. That's more than 160,000 hours of tit for tat, including 480,000 videos duplicated since 1987. C-SPAN calls its program database—indexed by subject, speaker names, titles, affiliations, sponsors, committees, categories, formats, policy groups, and location—an "unparalleled chronological resource." No debate here. Beyond videos free to watch, C-SPAN says duplicate programs are available for sale for educational, research, review, or home viewing purposes. Sales go back into supporting the archives' operation. ▲

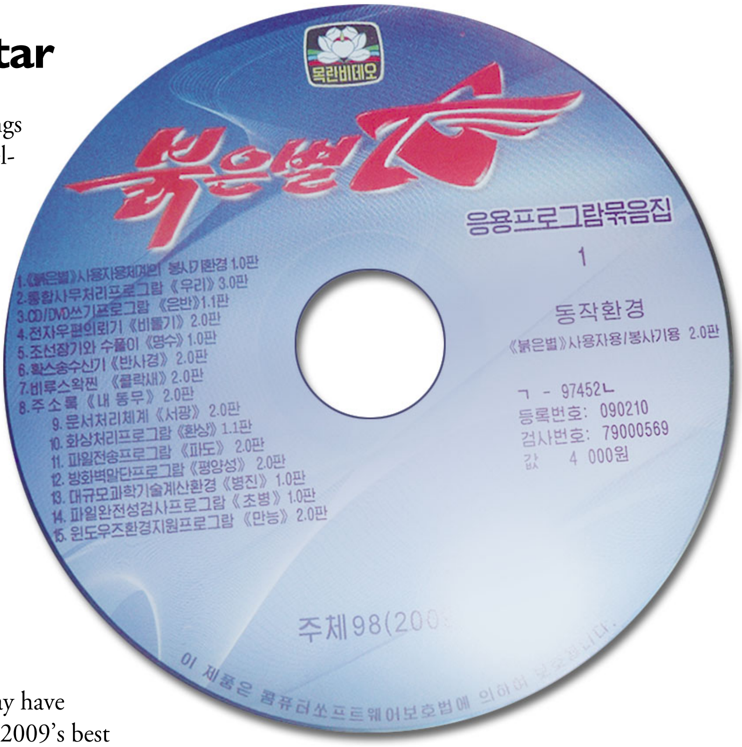
Paris 26 Gigapixels Is Etonnant

What do you get when you stitch together "2,346 single photos showing a very high-resolution panoramic view of the French capital?" Paris 26 Gigapixels, an incredible undertaking that "thanks to very deep zooming abilities" puts the "smallest details of Paris monuments" and more within your virtual reach. To be precise, we're talking 354,159 x 75,570 worth of details here. Amazingly, the site's operators say the panoramic wonder can be "printed on a 6,500-square-foot support whilst keeping an excellent quality." Creating the view, which occurred in September 2009, involved using two 21.1MP Canon EOS 5D Mark II D-SLRs, each with a 300mm f4.0 teleconverter lens. ▲



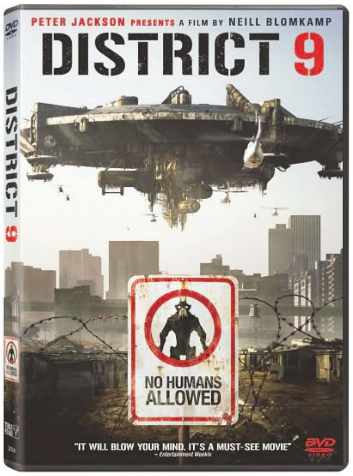
Compiled by Blaine Flamig

North Korea Sees The Red Star


목란비데오
붉은별
응용프로그람묶음집
1
동작환경
《붉은별》사용자용/봉사기용 2.0판
1.《붉은별》사용자용체계와 봉사기환경 1.0판
2.통합사무처리프로그람 《우리》 3.0판
3.CD/DVD쓰기프로그람 《은반》1.1판
4.전자우편읽기 《비둘기》 2.0판
5.조선장기와 수풀이 《명수》 1.0판
6.확스송수신기 《반사경》 2.0판
7.비루스왁찐 《클락새》 2.0판
8.주소록 《내 동무》 2.0판
9. 문서처리체계 《서광》 2.0판
10. 화상처리프로그람 《환상》 1.1판
11. 파일전송프로그람 《파도》 2.0판
12. 방화벽말단프로그람 《평양성》 2.0판
13. 대규모과학기술계산환경 《병진》 1.0판
14. 파일완전성검사프로그람 《초병》 1.0판
15. 윈도우즈환경지원프로그람 《만능》 2.0판
ㄱ - 97452ㄴ
등록번호: 090210
검사번호: 79000569
값 4 000원
주체98(200
이 제품은 콤퓨터쏘프트웨어보호법에 의하여 보호됩니다.

Need further proof that North Korea prides itself on doing things its own way? According to various reports, the country has developed its own Linux distro called Red Star. Details of the OS, which is said to include a GUI resembling Windows that's based on KDE, came to light when a Russian student attending North Korea's Kim Il-Sung University bought a copy for $5 and posted a review on his blog. Reportedly, installation is possible via boot disc, hard drive, or the Internet and takes 10 to 15 minutes. If you're interested in getting a closer look, bone up on your Korean, as that's the only language the OS supports. ▲

Downloaders: "District 9" Was 2009's Best Picture


PETER JACKSON PRESENTS A FILM BY NEILL BLOMKAMP
DISTRICT 9
NO HUMANS ALLOWED
"IT WILL BLOW YOUR MIND. IT'S A MUST-SEE MOVIE" – Entertainment Weekly
DVD

"The Hurt Locker" may have been Oscar's choice as 2009's best picture, but the fans' top choice was actually "District 9"—at least among BitTorrent downloaders, that is. According to TorrentFreak, BitTorrent users fired up their clients to haul in the movie to the tune of nearly 12.64 million times last year. "Avatar" followed with roughly 11.3 million downloads, although as TorrentFreak points out, "comparing the downloads of each of the nominees is not really fair since some films have been available online for more than a year already, while others only leaked a few weeks ago." Among the 10 films that were nominated for an Oscar as Best Picture, "The Blind Side" and "An Education" finished ninth and 10th on TorrentFreak's list, respectively. ▲

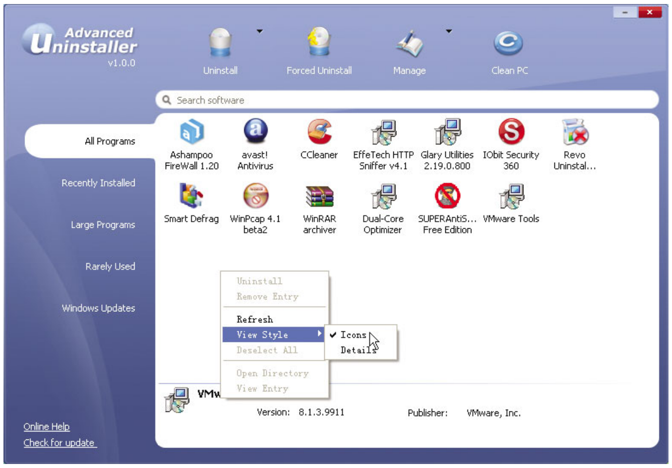
Sorry XP, It's Time We See Other OSes

It appears Microsoft isn't the only one distancing itself from Windows XP. In a recent poll that Dimensional Research conducted for Kace of 923 IT pros, 87% now plan to deploy Windows 7, and 46% plan to do so before Win7 SP1 is released (expected this summer). Further, only 25% of those polled expressed concern about Win7's performance vs. 47% who expressed as much in a similar 2009 study. Dimensional Research's Diane Hagglund stated that one factor in the increased interest in migrating to Win7 is that WinXP is reaching its end. "As Windows XP becomes out-of-date and more expensive to support and with Vista increasingly insignificant, IT leaders are embracing Windows 7," she stated. Elsewhere, only about 32% of those polled indicated they were contemplating migrating to a Windows alternative vs. the 50% considering such a move last year. ▲

SOFTWARE SHORTS

Iobit Advances Free Uninstaller

Most of you know that if you install a program and don't like it, you shouldn't count on Add and Remove programs to entirely get rid of it. Enter Iobit's recently released Advanced Uninstaller, self-described as a "lightweight software uninstall utility" that will usher stubborn files and folders out of the Registry and off your hard drive. Better, the software is free to download and doesn't require an installation to run. Features include batch and forced uninstalls, a log manager that shows what the program has altered, and automatic restore point creation. The 687KB download is good with Win2000/XP/Vista/7. ▲



Version: 8.1.3.9911

Publisher: VMware, Inc.

Intel Rewards High School Smarty Pants With $100,000

Congrats are in order for Erika DeBenedictis, an 18-year-old high school senior from Albuquerque, N.M., who walked away with the $100,000 first-place prize at the Intel Science Talent Search 2010 in Washington, D.C., in mid-March. Overall, 40 high school seniors from 18 states and 36 schools vied for $630,000 in prize money for the contest, described as "America's oldest and most prestigious pre-college science competition." DeBenedictis' winning project involved developing a software navigation system aimed at bettering spacecraft travel around the solar system. Specifically, DeBenedictis found that planets' gravity and movements create "easy transit routes" that will enable spacecraft to move faster and with less fuel. ▲

Google skipfish Lures The Security-Minded

With Web apps' increasing popularity, it's not surprising that they're known to contain a vulnerability or two. Google is doing its part to rectify that problem with skipfish, a free, automated, and open-source scanning program. Although Google writes on skipfish's documentation page that paid and open-source tools, including Nikto and Nessus, with similar abilities are already on the scene, "skipfish tries to address some of the common problems associated with Web security scanners." skipfish writer and maintainer Michal Zalewski cites its high speed ("the tool easily achieves 2,000 requests per second with responsive targets"), ease of use (heuristics "support a variety of quirky Web frameworks and mixed-technology sites"), and cutting-edge security logic (high-quality, low false positive, differential security checks can spot "a range of subtle flaws, including blind injection vectors.") The current 1.10 beta is "believed to support Linux, FreeBSD 7.0+, Mac OS X, and Windows (Cygwin) environments." ▲

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Lance Ochs, www.vacantpixels.com

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Monthly Transfer Volume	Unlimited	3,000 GB	Unlimited
Mailbox Size	2,000 MB	1,000 MB	1,000 MB
Private Domain Registration	FREE	$9.00/year	–
Search Engine Submission	✓	✓	Extra charge applies
Money Back Guarantee	90 days	30 days	–
Special Offer	6 MONTHS 50% OFF	–	–
Price Per Month	~~$9.99~~ $4.99 for 6 months*	$9.96	$14.24
First Year Hosting Total (with discount)	$89.91/year	$128.52/year	$170.88/year

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Job Of The Month

How do you lock down a cloud? If you have the online security chops, then Amazon can use you to keep watch over its cloud-based Amazon Web Services. The software development manager for AWS Fraud Prevention Systems helps keep secure the thousands of businesses that leverage Amazon's cloud to power applications, online storage, Web sites, and ecommerce businesses. AWS powers services for companies such as Second Life, photo-sharing firm SmugMug, and Web data supplier Alexa. Your job would be to keep out the ne'er-do-wells who try to access the cloud improperly or use the cloud for fraudulent purposes. You will need to know your programming languages and understand the range of operating systems that access the cloud. Perhaps more to the point, because cloud computing itself is so new, you will need to anticipate and cut off system abuses that cybercriminals (and cybercops) are only beginning to imagine.

tinyurl.com/yjzzoz9

Consumers Open Up To Ebooks

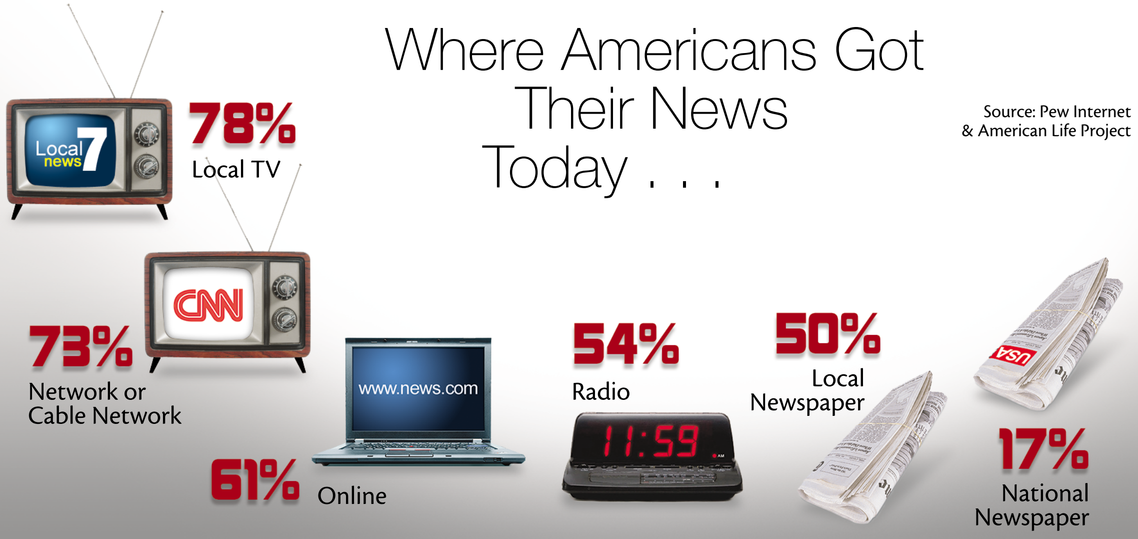
After years of sluggish growth, ebooks finally got some traction last year as sales more than doubled. (Sales in millions of dollars.)

	2002	2003	2004	2005	2006	2007	2008	2009
Total Trade Sales	3,897.70	3,838.30	3,794.70	5,058.50	5,036.40	5,457.90	5,158	5,127.10
Ebook Sales	2.1	6	9.3	16	25.2	31.7	61.3	169.5
Ebooks as % of Trade	0.05	0.16	0.25	0.32	0.5	0.58	1.19	3.31

Source: Association of American Publishers

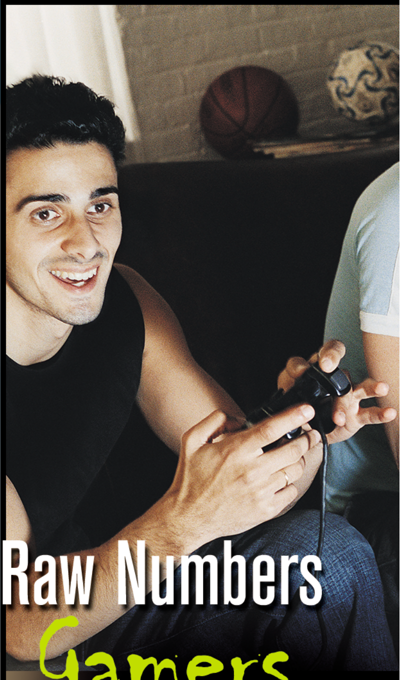
Where Americans Got Their News Today . . .

Source: Pew Internet & American Life Project



HR Is Following Your Online Social Life

As all of us reveal more of ourselves online via social networks, job hunters may be unaware how recruiters and human resources professionals are taking notice. In a new survey of consumers commissioned by Microsoft, only 7% believed that data recruiters and potential employers found about them online had impacted their selection criteria. On the other hand, the same survey found that 70% of HR and recruiting professionals had rejected job candidates on the basis of information about the candidates found online, and 75% indicated that such checks are company policy. In other words, your Facebook friends aren't the only ones reading your wall.



Raw Numbers

Gamers

8 Hours

Average time per week gamers play online, up 10% since 2009

NPD Group

43

Average age of online gamers on social networks

PopCap

$13.1 Billion

Sales of PC games worldwide in 2009, up 3% from previous year

PC Gaming Alliance

220 Million

Number of video game consoles installed worldwide by end of 2010

Strategy Analytics

DREAM HARDWARE

Getting from point A to point B . . . restoreth thy soul.
This month, anyway. *Bon voyage.*

by Marty Sems

Martin Aircraft Jetpack

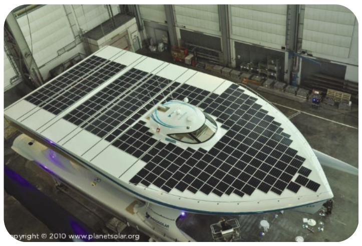
Whee! No longer do you have to infiltrate undisclosed agencies nor shoot down alien spacecraft every time you get a hankering for a new jetpack. This here outfit is just coming right out and *selling* them. New Zealand-based Martin Aircraft's (www.martinjetpack.com) Jetpack runs on premium, believe it or not, and carries enough gas for a half-hour flight. A 200hp four-cylinder works the twin fan jet rotors, giving the 'pack a top speed of 63mph and a range of 31.5 miles. Or, should your fortress become too welcoming of in-laws, you can find solitude a mile and a half from home . . . straight up. Oh, relax: If the thing stalls out, you can always pop the parachute and let the shock-absorbing undercarriage solve the last meter problem. Ten percent down puts you on the list for a $100,000 Jetpack when production starts later this year. ▲

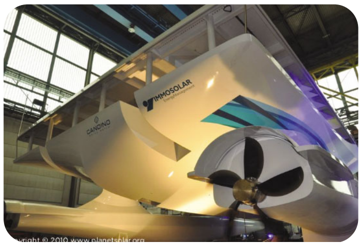
Citroën Survolt

If Batman were French, Wayne Enterprises would have its wings deep in electrical energy production. And its belfry would be manned by the man with this 'mobile in his subterranean garage. When Citroën (www.citroen.ch) isn't duking it out with Ford on the World Rally Championship trail, it's entertaining provocative notions such as the Survolt concept. Obviously a bid to give *Le Chevalier Noir* a stealthy way to glide through the night, Survolt runs wild on pure electricity. And being French, it's kinda teensy at just 12.6 feet long. Just across the Maginot Line is an equally rakish but almost certainly more Gauls-to-the-wall *überwagen*, Porsche's 918 Spyder hybrid concept. Can you say 218hp of Li-ion electric motorvation plus a 500hp V8? *Ja,* baby! ▲

PlanetSolar

A hundred and two feet from stem to stern, this man-o'-peace is billed as the biggest solar-powered yacht in the world (www.planetsolar.org). Built by Knierim Yachtbau in Kiel, Germany, PlanetSolar is intended for "never-ending solar navigation." Indeed, its maximum 5,382 square feet of solar panels provide enough power to keep the 200-passenger enviroyacht putting about indefinitely. "The goal of this worldwide unique project is to sail around the world with a multihull vessel powered solely by solar energy," says the shipyard's site. "The trip will take approximately 140 days at a remarkable average speed of 8 knots—an environmentally friendly and almost silent way of traveling." Call us masthuggers, but this solmarine might put some wind in the sails of environmentalists who would love for the world to drop fossil fuels like an anchor. ▲





Solid-State Warriors

Top Picks From The Latest In Storage

The solid-state storage market is advancing at a breakneck pace. It seems that if a given manufacturer isn't announcing a new SSD product line every few weeks, a new firmware or optimization utility hits the scene that changes the performance landscape, usually for the better. The rapid pace of innovation in the SSD market is a sign that consumer interest is currently very high. And despite the excellent performance already offered by many SSDs, the products are still in their relative infancy.

Solid-state drives may still have a lot of maturing to do before they are as widely accepted as traditional, spinning hard drives, but over the last year, SSDs have definitely become more than just quirky, niche products for power users with deep pockets. Whereas some early SSDs suffered from numerous performance and compatibility issues, today's offerings are far more stable, and it's becoming much more difficult to differentiate the drives in terms of performance alone. Prices, while still extremely high compared to standard hard drives from a cost per gigabyte perspective, have even dropped to the point where SSDs are now attainable by mainstream PC users. And capacities have increased, too.

With the knowledge that power users are increasingly looking to solid-state storage and that many manufacturers (such as Intel, OCZ, Crucial, Kingston, Corsair, and Western Digital, to name a few) have released a slew of new products recently, we decided to round up as many SSDs as we could to give you all a snapshot of what the market currently has to offer. And, in addition to an impressive influx of fresh drives, some companies have introduced updated firmware for a couple of longtime favorites, adding new features and pumping up performance.

Vertex Limited Edition 100GB
$429 | OCZ
www.ocztechnology.com
●●●●

RealSSD C300 256GB
$799 | Crucial
www.crucial.com
●●●●◖

Oldies But Goodies

Since their initial releases, Intel's second-generation X25-M 160GB drive and OCZ's Vertex have emerged as two of the most popular SSDs available. We reviewed both of these drives in previous issues of *CPU* (see page 28 and 35 in the December 2008 and July 2009 issues, respectively), but well after going to press, new firmware for the X25-M and Vertex was released that completely changed their performance profiles. Intel's latest firmware boosted the X25-M's write speeds by about 30% and enhanced its garbage collection algorithm. The OCZ Vertex received a new garbage collection algorithm, too, as well as official support for TRIM. Because these drives are so popular and their performance has changed so much since our original reviews, we decided to include them in this roundup as baseline performance comparisons. (Performance numbers are available online.) As you'll see, as good as these drives are, they're no longer the kings of the hill.

OCZ Vertex Limited Edition 100GB

The OCZ Vertex Limited Edition's claim to fame is its SandForce SF-1500 controller . . . sort of. Technically, the SF-1500 is designed for enterprise-class applications, and drives based on the controller will command hefty price premiums; the SF-1200 will be more consumer-targeted. But because of OCZ's close working relationship with SandForce, the former company was able to score a few thousand SF-1500 controllers, which are based on an early

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●◖ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT revision of the chip and not qualified for the above-mentioned enterprise applications, at a big discount. The chips were perfectly suitable for consumer duty, so OCZ branded the chips with its own logo, and the Vertex LE was born.

The controller in the OCZ Vertex LE is unique in a couple of ways. For one, it doesn't require any DRAM cache. Rather, it uses the same NAND flash that's used for storage as a data cache and for garbage collection and date management. It also significantly reduces write amplification, which improves write performance, and offers impressive read bandwidth. The sum of the Vertex LE's parts equate to one seriously fast solid-state drive. In fact, it's the fastest we tested when paired to a 3Gbps SATA interface. Factor 6Gbps SATA into the mix though, and Crucial's RealSSD C300 has an edge in many tests.

Crucial RealSSD C300 256GB

There is a lot to like about the Crucial RealSSD C300. The drive conforms to the same 2.5-inch form factor as all of the other drives represented here, but Crucial doesn't use a common black case adorned with a boring sticker overloaded with specs like most of the others. Instead, the RealSSD C300 features a good-looking, gun-metal textured enclosure with a stylized decal on top; the specs are relegated to a second decal on the bottom.

Inside the drive is where the real interesting stuff is going on, though. The Crucial RealSSD C300 is outfitted with a Marvell 88SS9174-BJP2 controller, which gives the drive native support for 6Gbps SATA transfers—the only one in the roundup. The C300 also features 34nm Micron ONFI 2.1-compliant MLC NAND flash memory and a fast DRAM cache. Overall, the Crucial RealSSD C300 turned out to be one heck of a performer, especially when connected to a 6Gbps SATA controller. When connected to a more common 3Gbps SATA controller, the drive still performed exceptionally well, but it needs a 6Gbps interface to really open up.

SiliconEdge Blue 256GB
$799 | Western Digital
www.wdc.com
● ● ●

Torqx 128GB
$389 | Patriot Memory
www.patriotmem.com
● ● ● ◖

Nova Series V128
$389 | Corsair
www.corsair.com
● ● ●

Western Digital SiliconEdge Blue 256GB

Although Western Digital is known for its excellent hard drives, acquiring Silicon Systems in March of last year was an obvious sign that the company planned to enter the SSD market at some point. Well, there is no longer a need to speculate, because the WD SiliconEdge Blue has arrived.

Externally, the WD SiliconEdge Blue is much like the other drives in the roundup. It has a 2.5-inch form factor and a sturdy metal case, although the metal used on the SiliconEdge Blue seems more rigid than the others. The particular drive we tested was a 256GB model outfitted with Samsung MLC flash memory and a WD-branded controller. Although the controller in the drive has WD markings, it actually comes by way of JMicron. We're told WD custom engineered the SiliconEdge Blue's firmware, however. The drive has gone through extensive qualification and shouldn't behave exactly like other JMicron-based drives. As for performance, the drive's "Blue" branding hints that it will not be WD's flagship SSD. Performance was good in our testing, but not as good as some of the other drives in the roundup.

Patriot Memory Torqx 128GB

Patriot's Torqx 128GB SSD, like OCZ's original Vertex Series, sports Indilinx's Barefoot solid-state controller. Patriot's drive, however, features different firmware and faster cache memory that gives the Torqx a performance edge over OCZ's popular offering, albeit only a small one.

Overall, performance of the Patriot Torqx 128GB drive was very good, and its cost per gigabyte is fairly competitive, falling somewhere in the middle of the pack. Patriot's 10-year warranty, however, is much better than the competition.

Corsair Nova Series V128

Corsair seemed to take a relatively conservative approach to the solid-state storage market at first, unlike archrival OCZ. Whereas OCZ has released drives based on virtually every controller type, Corsair originally stuck with Samsung only. Recently though, Corsair has stepped up its game and released three new series of SSDs, namely the Reactor, Force, and Nova, the last of which we'll

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ● ● ◖ 2.5 = ABSOLUTELY AVERAGE | ● ● ● ● ● 5 = ABSOLUTELY PERFECT

cover here. We took the Nova Series V128 for a spin.

As its name suggests, the Nova Series V128 is a 128GB drive. Like the other drives represented here, it uses a standard 2.5-inch form factor. And other than a couple of decals, the V128's only outward features are its power and data connectors. Internally, this SSD is equipped with an Indilinx controller and 64MB of DRAM cache, which, as our benchmark scores show, makes it perform much like the Patriot Torqx. They're priced the same, too. Give Patriot the edge if you favor a long warranty; otherwise, a Torqx-Nova drag race will more than likely end in a photo finish.

A-Data S596 128GB

A-Data's S596 128GB drive stands out from the rest of the pack in a couple of ways. Its performance was very good for the most part, but not spectacular in light of some competing drives (such as the Vertex LE, for example). However, the S596 was the only drive of the bunch to feature a built-in mini-USB port, which is extremely handy when upgrading an existing system with an SSD. In addition, the S596 was also the only drive to sport an integrated activity LED, and, perhaps best of all, this drive's price per gigabyte was the lowest of the bunch.

The A-Data S596 is built around a JMicron controller and is outfitted with 128MB of cache. Performance was in line with WD's offering, but its warranty is only two years. But with a sub-$300 price tag, handy built-in features, and a firmware update on the way, this is one drive we can easily recommend. And, if you can be patient, SandForce-based A-Data SSDs should arrive later this year.

S596 128GB
$299 | A-Data
www.adatausa.com
●●●●

G.Skill Falcon II 128GB

The G.Skill Falcon II 128GB is yet another drive built around the popular Indilinx Barefoot SSD controller. From a feature and specifications standpoint, the Falcon II is very similar to drives such as the Patriot Torqx and Corsair Nova Series. As is typically the case with G.Skill products, though, the Falcon II is priced aggressively and can be had for about 10% less than similar drives, while offering similar performance.

The 128GB Falcon II we tested featured 128MB of cache and performed right on top of the Corsair Nova Series V128.

Kingston SSDNow V+ Series 128GB

When Kingston's relationship with Intel broke down a few months ago, the company turned to Toshiba to help produce a new line of SSDs. Kingston's new SSDNow V+ Series 128GB drive is the only one represented here that features a Toshiba controller, but its other specifications match up well to the offerings built around JMicron's controller (A-Data and WD).

Performance-wise, the SSDNow V+ Series offered better sustained writes than the JMicron-based drives, but random writes were among the lowest of the bunch. Reads were competitive across the board.

We should point out the Kingston SSDNow V+ Series is offered in two configurations—either as a bare drive or in a "desktop upgrade kit" that includes an external USB drive enclosure and

Solid Specs

To make it easy to compare the features and specifications of all the solid-state drives in this roundup, we've compiled a list of pertinent details from each of their respective spec sheets. Please keep in mind, however, the rated sequential speeds in this chart don't necessarily translate directly into better performance. Some of the drives actually performed better than their ratings would suggest.

	Patriot Torqx 128GB	Corsair Nova Series V128	Kingston SSDNow V+ Series 128GB
Formatted capacity	119GB	119GB	119GB
Controller type	Indilinx	Indilinx	Toshiba
Flash type	MLC	MLC	MLC
Form factor	2.5-inch	2.5-inch	2.5-inch
Interface	3Gbps SATA	3Gbps SATA	3Gbps SATA
Rated sequential speeds (read/write)	260MBps / 180MBps	270MBps / 195MBps	230MBps / 180MBps
Cache	64MB	64MB	128MB
TRIM support	Yes	Yes	Yes
Shock resistance	1,500G	40G (Vibration)	1,500G
Warranty	10 years	2 years	3 years
Price	$389	$389	$379
Cost per GB	$3.04	$3.04	$2.96

* Cache not required with SandForce controller.

Falcon II 128GB
$350 | G.Skill
www.gskill.com
●●●◖

SSDNow V+ Series 128GB
$379 | Kingston
www.kingston.com
●●●

X25-V 40GB
$125 | Intel
www.intel.com
●●●

software to help transfer data from an existing installation to the SSD.

Intel X25-V 40GB

The Intel X25-V 40GB is designed to be used solely as a boot volume. Install your OS and a couple of your most commonly used apps and that's it. In that respect, it will work very well. But because of the drive's low capacity, and hence fewer flash chips, only half of the drive controller's channels are utilized. This results in vastly decreased write performance, as our benchmarks show.

On a technical level, the X25-V is identical to the popular X25-M Gen. 2 160GB drive. But its sustained write performance can't come close to the larger drive. Regardless, as a boot drive, it would be a significant performance upgrade from a standard hard drive. And at only $125 it's relatively cheap.

Switch to any one of these drives from an HDD, and you'll immediately perceive the performance benefits.

The Bottom Line

Ultimately, all of the SSDs we tested here offer access times and read/write performance that are vastly superior to standard hard drives, with the sole exception being the Intel X25-V's relatively low write performance. Switch to any one of these drives from an HDD, and you'll immediately perceive the performance benefits. ▲

by Marco Chiappetta

A-DATA S596 128GB	G.Skill Falcon II 128GB	WD SiliconEdge Blue 256GB	OCZ Vertex Limited Edition 100GB	Crucial RealSSD C300 256GB	Intel X25-V 40GB
112GB	119GB	238GB	93GB	238GB	37.27GB
JMicron	Indilinx	WD (JMicron)	SandForce	Marvell	Intel
MLC	MLC	MLC	MLC	MLC	MLC
2.5-inch	2.5-inch	2.5-inch	2.5-inch	2.5-inch	2.5-inch
3Gbps SATA	3Gbps SATA	3Gbps SATA	3Gbps SATA	6Gbps/3Gbps SATA	3Gbps SATA
250MBps / 180MBps	220MBps / 150MBps	250MBps / 170MBps	270MBps / 250MBps	355MBps / 215MBps	170MBps / 35MBps
128MB	64MB	128MB	None*	128MB	32MB
Yes	Yes	Yes	Yes	Yes	Yes
1,500G	1,500G	1,500G	1,500G	1,500G	1,500G
2 years	2 years	3 years	3 years	3 years	3 years
$299	$350	$799	$429	$799	$125
$2.34	$2.73	$3.12	$4.29	$3.12	$3.13

CPU RANKING ● 0 = ABSOLUTELY WORTHLESS | ●●◖ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

Solid-State Drive Performance Comparisons

To test all of the solid-state drives in this roundup, we installed each one individually as a secondary volume in our Intel Core i7 965-based test bed, with a standard, spinning HDD for the OS and benchmark installations. We left the SSDs blank and without partitions unless a test required them to be partitioned and formatted, as was the case with our ATTO, PCMark Vantage, and CrystalDiskMark benchmark tests. We also secure-erased all of the drives prior to starting the tests. We disabled Windows Firewall, Automatic Updates, and screen savers before testing, too. And in all test runs, we rebooted the system and waited several minutes for drive activity to settle before invoking a test.

As you can see in the chart, two drives emerged as the performance leaders—the OCZ Vertex LE and Crucial RealSSD C300, the latter especially when connected to a 6Gbps SATA controller. All of the drives performed very well, however. Unlike early first-generation SSDs, the current crop of drives all put up strong sustained read and write scores, fast access times, and low CPU utilization. It's only with regard to random reads and writes that some drives distance themselves from the pack. Although we'd consider the drives with the strongest random read and write scores to be the best performers overall, they're also, not surprisingly, the most expensive in terms of cost per gigabyte. (Full chart is available online.)

	Patriot Torqx 128GB	Corsair Nova Series V128	Kingston SSDNow V+ Series 128GB	A-DATA S596 128GB	G.Skill Falcon II 128GB	WD SiliconEdge Blue 256GB	OCZ Vertex Limited Edition 100GB	Crucial RealSSD C300 256GB (3Gbps SATA)	Crucial RealSSD C300 256GB (6Gbps SATA)	Intel X25-V 40GB
HDTach v3.0.1.0										
Full Bench (MBps)										
Average Read	232.3	217.2	213.3	216.7	230.2	216.9	222.4	237.4	320.8	240.4
Average Write	226.1	192	203.2	172.5	209.7	177.9	235.1	207.6	222.1	44
Burst Rate	195.2	192.3	237.6	248.6	199.7	241.3	257.2	258.8	350.4	261.2
Random Access (ms)	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1
CPU Utilization	1%	1%	2%	1%	1%	2%	1%	2%	2%	2%
SiSoft SANDRA 2010c										
Physical Disk Test (MBps)										
Drive Index: Read	251.9	244.14	221.61	228	242.6	224	258	264.81	341.57	161.54
Drive Index: Write	190.67	190.26	123.3	130.9	189.89	158.62	221	209.67	220.72	42.48
CrystalDiskMark x64 v3b5										
Reads (MBps)										
Sequential	240.4	252.5	236.2	242.1	260.1	239.9	214.6	278.9	363.8	195.9
512K	163.6	185.6	198.8	165.5	181.5	199.5	201.4	265.4	333.4	162.2
4K Random	28.39	29.97	19.64	16.68	29.94	17.67	21.22	30.26	33.73	21.93
4K QD32 Random	65.13	71.33	19.07	19.33	71.31	18.45	129	204.6	217.2	136.9
Writes (MBps)										
Sequential	143.6	168.6	183.3	165.5	168.7	191.2	145.2	212.1	221.7	42.93
512K	109.8	114.5	114.4	151.7	186.9	151.1	143.2	69.4	224.1	44.64
4K Random	11.85	9.82	14.26	23.33	9.84	18.04	71.71	65.62	76.05	26.19
4K QD32 Random	11.24	9.78	17.51	27.8	9.82	16.73	133	185.8	181.1	42.59
PCMark Vantage x64										
HDD Suite (MBps)										
Windows Defender	119.04	125.2	143.07	112.96	127.31	113.87	194.24	179.55	219.94	124.76
Gaming	128.85	133.7	144.43	126.9	135.59	127.37	186.44	179.31	230.23	128.57
Importing Pictures to WPG	144.21	158.1	179.74	172.26	159.02	168.75	225.52	220.53	280.32	143.77
Windows Vista Startup	130.85	121.1	137.41	122.02	130.85	114.01	215.74	207.16	242.69	129.36
Video Editing Using WMM	147.82	146.7	150.48	135.42	147.64	138.13	183.26	178.14	213.08	97.02
Windows Media Center	183.31	196	208.72	168.61	198.29	167.14	240.12	235.21	277.11	94.07
Adding Music To WMP	96.72	99.34	118.38	85.61	99.93	82.15	159.21	117.58	129.93	86.24
Application Loading	75.27	70.98	79.57	64.89	72.47	56.38	204.11	124.24	117.48	90.61
Price	$389	$389	$379	$299	$350	$799	$429	$799	N/A	$125
Rating	●●●◖	●●●	●●●	●●●●	●●●◖	●●●	●●●●	●●●●◖	N/A	●●●

Test system specs: 3.2GHz Intel Core i7-965, Gigabyte EX58A-UD5 (X58 Express w/ICH10R), 6GB OCZ DDR3-1333, WD Raptor 150GB (OS Volume), Windows 7 Ultimate x64, Intel Matrix Manager v8.9 (AHCI Enabled)

CPU RANKING ● 0 = ABSOLUTELY WORTHLESS | ●●◖ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

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ATI Radeon HD 5870 Eyefinity 6 Edition

Get Your Very Own Video Wall

At *CPU*, our goal when creating a test suite for a given component is to carefully select the benchmarks that can isolate and stress that component to its uppermost thermal, operational, and performance limits. With regard to graphics cards, however, that's been an increasingly difficult proposition. When the highest-end graphics cards of three generations ago let gamers play on 30-inch 2,560 x 1,600 displays, a resolution at which an infinitesimally small fraction of gamers actually run even today, then there's a massive problem for the two firms whose bread and butter are high-end GPUs. Relying on Microsoft to add new features to DirectX can only get you so far. Nvidia's solution appears to be PhysX, 3D Vision, and CUDA. ATI's unique approach to solving the problem of how to really catch gamers' eyes was a little less easy to discern. That is until it cooked up the Radeon HD 5870 Eyefinity 6 Edition, a graphics card capable of running up to six displays at once.

Déjà Vu

AMD recently sent us a Radeon HD 5870 Eyefinity 6 Edition and a sextuplet of 1,920 x 1,080 DisplayPort monitors for testing Eyefinity. Under the hood, the ATI Radeon HD 5870 Eyefinity 6 Edition is nothing new. As its model name suggests, it has a core clock of 850MHz and 1,600 stream processors, just like the non-Eyefinity 5870. This card comes with double the GDDR5 memory though (2GB) and sports six mini DisplayPort outputs for an SLS (Single Large Surface) resolution up to 7,680 x 3,200. Eyefinity is currently limited to Windows Vista and Win7 PCs (AMD tells us that Linux support is on the way), and a system with two or more cards can support a maximum of eight displays (six in SLS mode and two in Extended mode).

The Fix Is Broken

We set up our 3 x 2 (three displays wide by two displays high) Eyefinity video wall in a communal area and let a number of the staff take a whack at Battlefield Bad Company 2, S.T.A.L.K.E.R.: Call of Pripyat, Dirt 2, World of Warcraft, and Left 4 Dead. Initial impressions were universally positive, the ATI Radeon HD 5870 Eyefinity 6 and a full complement of six displays is truly a spectacle to behold. Immersion is nearly total. But immersion is also where Eyefinity tripped up.

The bezels of the Dell P2210H displays aren't exactly thin, and playing with them crisscrossing our field of view took some getting used to. We discovered that not all games work well with a 3 x 2 setup. The bezels, whether compensated for or not, aren't as much of a problem in third-person perspective games like WoW, Dirt 2, and RTS games. First-person shooters, however, tend to split the crosshair at the bezel edge (with bezel compensation off) or obscure it entirely (with bezel compensation on). AMD tells us that it is working hard to tune what it politely calls these "limitations" in certain games, but thankfully, you can switch between 3 x 2 mode, 3 x 1 mode, or any other mode you configure, using hotkeys. You can also set up the displays in landscape and portrait mode to suit your needs.

ATI Radeon HD
5870 Eyefinity 6 Edition
$479 | AMD
ati.amd.com
● ● ●

Final Thoughts

Performance-wise, the games we tested were all capable of running at 30fps or better at 5,760 x 2,160 (not bezel compensated), which alone speaks volumes about the raw pixel pushing prowess of AMD's flagship GPU. The cost of entry for an Eyefinity 6 configuration is steep, and the resulting benefits are rather limited. Our favorite configuration, 3 x 1, was a much better experience that really enriches games. Unfortunately for AMD (and fortunately for you), this can be had with the non-Eyefinity 6 Radeon HD 5870. ▲

by Andrew Leibman

Specs: GPU: Cypress R870; Core clock: 850MHz; Memory: 256-bit bus, 2GB GDDR5 (1,200MHz); 1,600 shader processors; 80 texture units; 32 ROPs

Test system specs: Processor: 3.33GHz Intel Core i7-980X Extreme Edition; Motherboard: Intel DX58SO; RAM: 3GB Qimonda DDR3-1067 CL7; Graphics: ATI Radeon HD 5870 Eyefinity 6; Hard drive: 1TB Western Digital Caviar Black; Six 22-inch Dell P2210H displays

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ● ● ◖ 2.5 = ABSOLUTELY AVERAGE | ● ● ● ● ● 5 = ABSOLUTELY PERFECT

Intel Core i7-980X Extreme Edition

Core i7-980X Extreme Edition
$999 | Intel
www.intel.com
●●●●

Specs: Socket LGA 1366; Clock speed: 3.33GHz; 12MB L3 Smart Cache; QPI (25.6GBps); 32nm process; 130W max TDP
Test system specs: CPU: 3.33GHz Intel Core i7-980X Extreme Edition; Intel DX58SO motherboard; RAM: 3GB Qimonda DDR3-1067 CL7; Graphics: Nvidia GeForce GTX 280; Hard drive: 1TB Western Digital Caviar Black; Hyper-Threading enabled; Turbo Boost enabled

The Intel Core i7-980X Extreme Edition "Gulftown" is based on the Westmere architecture, which takes the guts of the Nehalem and shrinks it to 32nm—the tick of Intel's Tick-Tock (process shrink/new architecture) strategy for releasing products.

The Core i7-980X features a 248mm^2 die consisting of 1.17 billion transistors. The new chip takes Intel's advanced High-k + Metal Gate transistor dielectric, which is dramatically better at containing leakage than was the pre-45nm silicon dioxide transistor gate dielectric, to new dimensions. The Core i7-980X comes clocked at the same speed as the previous processor to sit in the Extreme Edition throne; the Core i7-975. But with this release, the firm bumped the shared L3 Smart Cache up to 12MB and added two discrete execution cores. Other features returning for an encore are the on-chip memory controller with support for three channels of DDR3-1066 memory, overclocking support, Intel QuickPath Interconnect, Turbo Boost, Hyper-Threading, SSE4.1 and SSE4.2 instructions, and support for Intel Extreme Memory Profiles and Intel's Extreme Tuning Utility.

Although there's nothing particularly new and revolutionary under the heat spreader, the Core i7-980X represents the first desktop processor with six discrete execution cores, and thanks to Hyper-Threading, it can process up to 12 independent computing threads. In enthusiast street cred, that's a trump card. The TDP for the Core i7-980X tops out at 130 watts, but the chip ships with Intel's redesigned CPU cooler, the DBX-B HSF, which consists of a 100mm fan strapped to an aluminum-finned and copper-heatpiped cube that secures to the chip surface with spring-mounted thumbscrews. This is one Intel cooler you won't want to toss at first sight. The chip works in X58 boards, though we had to install a BIOS update on our Intel DX58SO to get it to work.

And just how well does Intel's 6-core enthusiast flagship work? Well, in applications that can utilize more than four cores, the Core i7-980X works very well indeed. Real-world applications that can tap the Core i7-980X's potential include Adobe After Effects and Sony Vegas Pro 9.0c, as well as a slew of professional imaging and video-creation suites. In games, however, we found very little difference between the slightly slower Core i7-965 EE and the Core i7-980X. Intel claims that the new processor achieves increased performance in a handful of RTS games, such as the soon-to-be-released R.U.S.E. and the recently released Napoleon: Total War, as well as dozens of other games. But the games that stand to benefit measurably are those that rely heavily on AI and CPU-bound physics.

Like the Core i7-975 before it, Intel is selling the Core i7-980X for a cool grand. So if the former was worth its price in your eyes, then the latter is a steal, especially if you tend to use applications that scale beyond four cores. That's a mighty short list of applications, however, so for the rest of us the Core i7-980X will spend much of its time hungrily waiting for more data to crunch.

Meanwhile, in Intel's epic thumb war with AMD, Intel once more finds itself without a competitor—nothing from AMD is even close—and for the time being will have to be satisfied twiddling its thumbs. ▲

by Andrew Leibman

Benchmark Results		Core i7-980X Extreme Edition	Core i7-965 Extreme Edition
3DMark Vantage			
Overall	1,024 x 768	13530	13311
GPU Score		10760	10740
GPU1 (fps)		32.16	32.08
GPU2 (fps)		30.86	30.81
CPU Score		59433	47235
CPU1 (Plans/s)		4313.77	2840.46
CPU2 (Steps/s)		176.96	155.41
PCMark Vantage Pro 1.1			
Overall	1,024 x 768	9672	7737
Memories		6819	6666
TV And Movies		6093	5652
Gaming		9206	8172
Music		7326	7304
Communications		11907	6986
Productivity		6402	6150
HDD		4258	4175
Cinebench 10			
Multithreaded (score)		21429	15612
Multithreaded (min:sec)		0:41	0:56
POV-Ray 3.7 Beta (pixels/s)		4273.41	2847.47
SiSoft Sandra Lite 2010c			
Processor Arithmetic			
Dhrystone iSSE4.2 (GIPS)		132.12	87.47
Whetstone iSSE3 (GFLOPS)		112	75.43
Processor Multi-Media			
Integer x8 iSSE4.1 (Mpixels/s)		249.68	168.83
Floating Point x8 iSSE2 (Mpixels/s)		181.33	120.76
Double x2 iSSE2 (Mpixels/s)		94	62
Memory Bandwidth			
Integer Buffered iSSE2 (GBps)		18.10	16.81
Floating Point Buffered iSSE2 (GBps)		18.15	16.80
Dr. DivX 2.0.1 (min:sec)		3:46	3:57
WinRAR 3.71 (min:sec)		1:19	1:44
Games			
Far Cry 2 (8XAA)	2,560 x 1,600	27.72	27
Left 4 Dead (8XAA, 16XAF)		53.02	53.09

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Intel® Core™ i7-920 Processor	$1299

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- Asus® P6T SE Intel® X58 Chipset Motherboard
- ATI® Radeon™ HD 5870 1GB Video Card - DirectX 11 Support
- Thermaltake V9 Green Gaming Case + 800W SLI™ Certified Power Supply
- Intel® 40GB SSD (Boot) + 2TB HDD (Data)
- Liquid CPU Cooling System with 120mm Radiator
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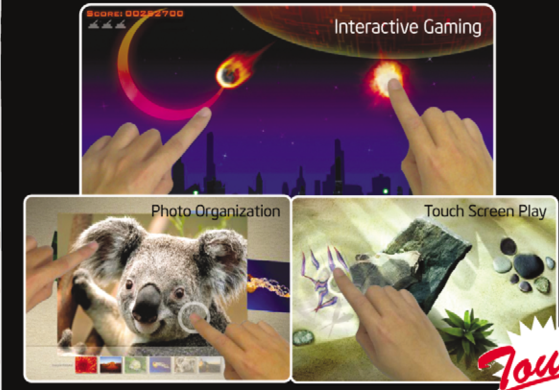

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Rosewill Libertas 800

We like the interior of our PCs to look clean; we also don't want to spend a lot of time routing and hiding the cables in our builds. The all-modular Libertas 800 let us only use the cables that were necessary for our build. The power supply is also 80 Plus Bronze-certified and provides a single 12V rail with 60A max current.

The Libertas 800 powered through our system tests without a glitch. We loaded it into a system with an Intel Core i7-860 running at 3.2GHz, two MSI Twin Frozr GTX 275 in SLI, and a 1TB Western Digital Caviar Blue. To test the Libertas, we continuously ran SiSoftware Sandra's suite of processor, graphics card, memory, and storage tests for three hours. At the same time, we also looped a CD and ran the graphics tests from 3DMark 06. During testing, the Libertas 800 ran quietly, likely due to the large 135mm cooling fan.

In terms of features, the Libertas provides an Active PFC that can automatically adjust AC-input voltage from 100 to 240V. For system safety, Rosewill also builds in protection for over-temperature, -current, -voltage, and -power as well as short circuit and under-voltage safeguards. Four PCI-E 6+2 pin cables (all the same length) are included as well as three SATA cables (two with three connectors, one with four) and two Molex cables (four connectors).

Rosewill backs the power supply with a three-year warranty and tells us that the Libertas 800 should work fine in a dual-Radeon HD 5870 or dual-GeForce GTX 285 setup.

With its solid performance and all-modular design, the Libertas proved to be a worthy power supply. ▲

by Nathan Lake

Libertas 800
$129.99
Rosewill
www.rosewill.com
● ● ● ●

Specs

Rated continuous (W)	800 (at 50 C)
12V Rails	1
+12V max (A)	60
+5V max (A)	30
+3.3V max (A)	24
SLI/CrossFire-certified	No
Max wattage tested	455
Power factor tested	98.5
Efficiency rating (as advertised)	80%
Cable side	motherboard
Fan location	top
Fan(s)	135mm
PCI-E	4 (6+2 pin)
Main 12V	20 + 4 pin
8-pin EPS 12V	1
4-pin 12V	1 (4+4-pin)
SATA	10
4-pin Molex	8
Floppy	2
Length (including cable bend)	6.5 inches
Warranty	3 years

Danger Den Tower 12

Danger Den's Tower 12 Black Series case is designed specifically for the HTPC or NAS build. As its name suggests, the Tower 12 is constructed of sleek, shiny black acrylic, save for the clear window inserts on each side panel.

For a small fee, both acrylic windows can be covered with a custom vinyl graphic of your choice. For our test model, Danger Den applied a *CPU*-themed graphic to both of our side panels. The vinyls fit neatly over the windows without any bubbling or sign of unevenness.

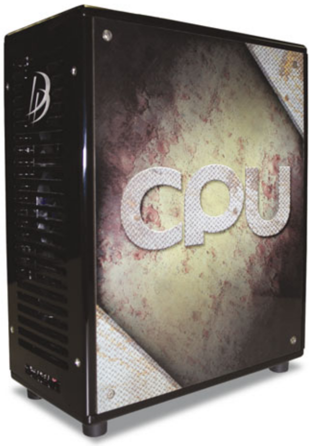
The Tower 12 ships unassembled. The assembly process was relatively self-explanatory, though online directions are available. We opted to assemble the entire case before adding our hardware, though the motherboard and fans could technically be attached to their respective panels before final assembly.

The Tower 12 is compatible with Mini-ITX motherboards but has no PSU slot, so your motherboard must have an external power adapter, such as what you'd find on your laptop. Danger Den recommends outfitting the Tower 12 with a motherboard from Zotac.

As we'd expect with most HTPC cases, working inside the Tower 12 was tight. But there was plenty of room for all our hardware, including three hard drives, which we found were easiest to install by removing the rear panel. Installing three 80mm fans (not included) required us to remove the front panel, though this was quick and easy. Depending on where you choose to place the Tower 12, the power button on the rear panel may become a small issue if you aren't using a remote to control the system.

Like any acrylic case, the surface of the Tower 12 was prone to fingerprinting while we handled it, but a soft cleaning cloth removed our prints without difficulty. Overall, the Tower 12 is a good-looking, simple-to-assemble case that would complement any home-theater setup. ▲

by Kris Glaser Brambila



Tower 12
$99.95
(not including custom vinyls)
Danger Den
www.dangerden.com
● ● ● ●

Specs: Motherboard compatibility: Mini-ITX; Bays: 3 3.5-inch internal; Fans: 3 80mm front (not included); Front ports: 2 USB, audio I/O; Dimensions: 12.5 x 5.15 x 10 inches (HxWxD)

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ● ● ◖ 2.5 = ABSOLUTELY AVERAGE | ● ● ● ● ● 5 = ABSOLUTELY PERFECT

Microsoft LifeCam HD-5000

LifeCam HD-5000
$49.95
Microsoft
www.microsoft.com
●●●●

In December 2009 (page 30), I declared Microsoft's LifeCam Cinema the best Web cam I'd used in years based on its excellent clarity, color accuracy, low-light adjustments, and brightness. Not much has changed with Microsoft's new LifeCam HD-5000, one of three 720p, 16:9 widescreen models MS recently released. What is different is the addition of TrueColor Technology, a proprietary image processing method with face tracking that "produces bright, colorful video in even the most challenging lighting conditions." Arguably better, the HD-5000 matches the Cinema's quality but at $30 less.

Design-wise, the HD-5000 is nothing like the LifeCam Cinema. Gone is the Cinema's nifty barrel-like design in favor of a box-like shape that's less unique but better suited for monitor bezels. Design holdovers include a bendable rubber clamp and integrated Windows Live Call button that starts call sessions.

To test TrueColor, I put the HD-5000 in several light-challenged settings, including under a desk, in an unlit room, and outdoors on a sunny deck. In darker settings, the camera took longer to auto focus but not enough to be distracting. Focus and color accuracy, meanwhile, were fantastic in normal lighting and still impressive in dark environments, although details did fall off. Elsewhere, the HD-5000's integrated microphone produced strong, clear audio in calls and video clips.

As with the Cinema, the HD-5000 includes slick Live Movie Maker (30fps HD supported), Live Photo Gallery, and Live Call integration. Yahoo! Messenger, AOL IM, and Skype are supported, and all flowed fine in my use at non-HD resolutions. Skype now supports HD video calls but only with Skype-certified models that encode and process video onboard, which the HD-5000 doesn't. For LifeCam Cinema owners, meanwhile, Microsoft has firmware available that adds TrueColor Technology. ▲

by Blaine Flamig

Specs: Video resolution: 720p (at 30fps); integrated TrueColor image processing technology; Windows Live Call button; Compatibility: Windows Live, Yahoo! Messenger, AOL IM, Skype

Thermaltake V3 Black Edition

Being no stranger to Thermaltake's consistent construction quality, we recognize that the chassis manufacturer has accommodated both the high-end and budget-conscious enthusiast time and again. If last month's Thermaltake Level 10 case caught you off guard with serious sticker shock, the Thermaltake V3 Black Edition should calm those anxieties, especially if you're in the market for an all-black, mid-sized chassis that won't deplete the checking account.

V3 Black Edition
$49.99
Thermaltake
www.thermaltakeusa.com
●●●◖

The V3's ventilation system is nothing to balk at, even with a price tag of $50. Built with various perforation styles on all sides but the right side panel, the V3 includes honeycomb and perforated mesh on the front panel, vents on the top (one available for a 120mm fan) and bottom interior panels, and a removable PSU dust filter you can install directly under a bottom-mounted power supply. Thermaltake also throws in a single LED exhaust fan to dissipate interior heat.

Surprisingly, the screws on the back panel are not tool-less, but in no way were they a pain to remove. You can disconnect the front panel with a considerable tug, which reveals the four otherwise hidden bays installed in the top half of the internal panel. The motherboard tray provides plenty of access to the back of the board, though there is only minimal room to run a large bundle of cables between the drive cages and the motherboard tray.

Some might label the V3 as inconspicuously designed, but for what you will shell out, the V3 is worthy of a legitimate rig, thanks to decent cooling, a practical internal architecture, and a good number of drive bays. ▲

by Joanna Safford

Specs: Case type: Midtower; Materials: Steel; Motherboard support: ATX, microATX; Bays: 4 5.25-inch external, 4 3.5-inch internal; Expansion slots: 7; Dimensions: 16.9 x 7.5 x 18.6 inches (HxWxD); Weight: 10.6lbs.; Fans: 1 120mm rear; Fan mounts: 1 120mm front, 1 120mm top, 1 120mm rear; Front ports: 2 USB 2.0, audio, mic

Netgear Push2TV Wireless Display Adapter

Push2TV Wireless Display Adapter
$99.99
Netgear
www.netgear.com
●●●◖

Specs: Display outputs: HDMI, DVI

One of the most talked-about introductions at this year's Consumer Electronics Show was Intel's WiDi (or Wireless Display) technology. In case you missed the company's demonstrations, WiDi promises to let you transmit whatever is on your notebook's screen to an HDTV wirelessly. WiDi isn't the first attempt at wireless display technology, but it does look to be the most consumer-friendly we've seen.

WiDi is exposed through the latest generation of Intel 802.11n Centrino-branded wireless adapters (the Ultimate-N 6300, Advanced-N + WiMAX 6250, and Advanced-N 6200), which include a new feature called My WiFi. In much the same way as Bluetooth devices create a PAN (personal-area network), so, too, does My WiFi. This means the actual connection process is quite easy. You pair the notebook and wireless receiver one time using a four-digit code, and the connection is saved. Beyond the current-gen Centrino wireless adapter requirement, WiDi also needs an Arrandale-based Core i7, Core i5, or Core i3 processor (with integrated HD Graphics) and Windows 7.

Unfortunately, it's not yet possible to piece your own WiDi-compatible notebook together. However, Best Buy sells three laptops from Dell, Sony, and Toshiba that support the technology, and all three builds are fairly well-balanced. They also all include Netgear's $100 Push2TV wireless display adapter—necessary for firing the video signal from laptop to television.

Testing WiDi

The Push2TV is able to receive a 2.4GHz WiDi signal and output to HDMI or composite audio/video connectors. Netgear includes an HDMI cable with the kit, and that's the interface we'd recommend for optimal quality. Our test platform consisted of a Dell Studio S15Z-2249CPN notebook with a Core i5-430M processor, 4GB of memory, and Intel's Centrino Advanced-N 6200 wireless card. At the other end, we had Netgear's Push2TV attached via HDMI to a Samsung UN55B8000XF 55-inch LED LCD.

Once we matched the wireless adapter's PAN to our Netgear receiver, the notebook switched from its native 1,366 x 768 resolution to 1,280 x 720. (1080p display output isn't supported in this generation, though videos saved at higher resolutions do play back without a problem.) Two other issues immediately jumped out at us. First, the colors seen on the notebook weren't reflected in the TV's output. Second, there's a roughly half-second delay between when you move the notebook's cursor and when you see it move on the television. Now, this isn't an artifact of transmitting over 802.11n. After all, we've used apps on the iPod touch that employ Wi-Fi to control a PC, and those are much more interactive. Intel could have cut down on latency at the expense of higher processor load. However, the target usage model here is aimed at queuing up content on Hulu or YouTube and watching on the big screen. As it stands, WiDi is unusable for gaming on an HDTV.

There's another drawback to consider. Although WiDi is designed for kicking back and watching high-def content wirelessly through your laptop, the technology presents itself to Windows as an unprotected HDMI output. So, anything that's played back with HDCP content protection—DVD and Blu-ray movies, for instance—won't work.

We played back feature films and TV shows in HD through Hulu, along with 720p-based content on YouTube, and found that although the video doesn't exhibit choppiness, it's also not as fluid as the notebook being cloned. And although compression artifacts aren't super-distracting while you're watching broadcast-quality programming, they're fairly noticeable on the Windows Desktop. Lossless this technology is not.

Though WiDi isn't perfect by any means, it's difficult to knock a technology that's being enabled using current-generation hardware. Of course, if you want to connect wirelessly in more than one location (or if Intel decides to turn WiDi on across its line of Centrino wireless adapters), you'll need to buy Netgear's Push2TV adapter. So long as you understand what WiDi can and can't do, we can definitely see the technology being a convenient novelty. And at roughly $100 per receiver, it isn't terribly expensive, either. ▲

by Paul Cross

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●◖ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

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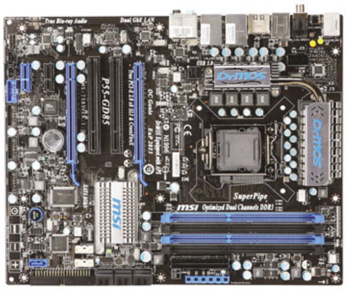
MSI P55-GD85



P55-GD85
$229
MSI
www.msicomputer.com
● ● ● ●

Since the initial introduction of Lynnfield and its accompanying P55 Express chipset and Socket LGA-1156, Intel's motherboard partners have taken what was supposed to be Intel's mainstream platform and augmented it with a number of cutting-edge features.

Take the MSI P55-GD85. The board is based on Intel's P55 Express chipset and supports all Lynnfield-based Core i5 and i7 processors. In addition to exploiting all of the features inherent to the P55 Express chipset, though, the P55-GD85 also features USB 3.0 (NEC) and 6Gbps SATA (Marvell SE9128) controllers, along with a PLX PCI-E switch that enables a high-bandwidth connection to the chipset for these controllers.

Despite being packed with additional controller chips, the MSI P55-GD85 has a relatively clean, well thought-out layout. All of the major connectors and headers are situated around the edges of the board, and everything is clearly labeled, making for easy installation. The P55-GD85 also greets users with a feature-laden BIOS, complemented by overclocking and monitoring applications that run within Windows. Overclocking the P55-GD85 was quick and painless, and performance and stability were excellent throughout testing.

With a price hovering around $230, the P55-GD85 is an expensive P55-based motherboard, but its enthusiast-friendly features and capabilities easily justify the price. Anyone looking to build a high-end, Lynnfield-powered rig for overclocking should give this board a serious look. ▲

by Marco Chiappetta

Benchmark Numbers	MSI P55-GD85
PCMark Vantage (Default)	
PCMarks	9204
Memories	7216
TV and Movies	5781
Gaming	10392
Music	8287
Communications	8254
Productivity	7801
3DMark06 (Default)	
CPU Benchmark	5624
Cinebench R10	
Multi-Threaded	19022
LAME MT (minutes:seconds)	
Multi-Threaded	0:25
x264 HD Encoding (fps)	
First pass	81.94
Second pass	31.03
Crysis v1.21	
800 x 600, low quality	169.48

Test system specs: CPU: 2.93GHz Core i7-870; RAM: 4GB Corsair DDR3; GPU: Nvidia GeForce GTX 280; Storage: Western Digital Raptor 150GB; Windows 7 Ultimate 64-bit

Specs: Chipset: P55 Express; Form factor: ATX; Ports: 2 Gigabit Ethernet, 2 6Gbps SATA, 8 3Gbps SATA, 2 USB 3.0, 5 USB 2.0, 1 eSATA/USB combo, 2 PS/2, 6 Audio, 2 S/PDIF; Slots: 2 PCI-E x16 (SLI/CrossFire), 2 PCI-E x1, 2 PCI

CoolIT Systems ECO A.L.C.

ECO A.L.C.
$74.99
CoolIT Systems
www.coolitsystems.com
● ● ●

Specs: Socket support: LGA-1366/1156/775, AM3/AM2; Materials: copper (waterblock), aluminum (radiator); Integrated CFF1 water pump; Fan: 120mm, 1,800rpm (max); two-year warranty

The CoolIT Domino A.L.C (Advanced Liquid Cooling) was one of the first low-cost, easy-to-install, self-contained liquid-cooling kits to gain mass acceptance by enthusiasts and overclockers. We reviewed the product in the March 2009 issue (see page 44) and praised it for ease of use and strong performance.

But once the Domino found its way into consumer systems, a number of issues arose related to long-term reliability and case compatibility. Feedback from customers prompted CoolIT to work on a new unit that would address the issues that popped up with the Domino. The result is the new ECO A.L.C.

The ECO A.L.C is another self-contained liquid-cooling kit, designed for a mainstream audience. It lacks some of the features of the Domino, such as the LCD readout, but the ECO is a much more user-friendly product. Its slim radiator and 120mm fan are designed for virtually any case with a rear 120mm fan location. And the ECO's heat exchanger's sliding retention screws accommodate all current Intel CPU sockets. (Socket AM3/AM2 mounts are also included.) The ECO's tubing and fittings have gone through more rigorous testing.

Installing the ECO couldn't be any easier. Select the proper bracket for your CPU socket, stick it to your motherboard, and screw the heat-exchanger down slowly. Then mount the fan, and you're done.

The ECO's performance was fairly good. Affixed to an Intel Core i7-975 on an Asus P6T Deluxe, the ECO managed idle and load temperatures around 44 and 58 degrees Celsius, respectively. Using a stock Intel cooler resulted in 46/65 C idle/load temps. With the CPU overclocked to 3.9GHz, the ECO also performed relatively well, with idle/load temperatures of 49/69 C. The stock cooler couldn't handle that overclock without causing instability.

The CoolIT ECO A.L.C. is a nice product, but similarly priced alternatives, such as the Corsair H50, perform somewhat better. Still, we would recommend the ECO to anyone interested in giving liquid-cooling a shot. ▲

by Marco Chiappetta

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ● ● ◖ 2.5 = ABSOLUTELY AVERAGE | ● ● ● ● ● 5 = ABSOLUTELY PERFECT

Western Digital My Book 3.0

My Book 3.0
$199.99
Western Digital
www.wdc.com
● ● ● ●

If you're as tired as we are of USB drive vendors trying to one-up each other with different enclosure cosmetics and bundled backup apps, rejoice. Western Digital now brings us the My Book 3.0, the company's first-ever USB 3.0 drive. USB 3.0 increases USB 2.0's 480Mbps theoretical limit by an order of magnitude, up to 4.8Gbps. Are you going to get a 10-fold improvement going from USB 2.0 to 3.0? Of course not, but you should be able to realize the drive's internal, sustained transfer rate.

Western Digital stocks the My Book 3.0 with its own Caviar Black drive with 64MB cache. Stuck inside a USB 2.0 enclosure, the Caviar Black—and just about every other drive—is bottlenecked at under 40MBps. But smack a USB 3.0 interface on that enclosure and bundle a PCI-E 2.0 x1 adapter card, and now you've tripled your sustained throughput.

This is exactly what our tests reveal. Our ATTO numbers show the drive throughput bottlenecking right around 133MBps and hitting right up against the Black's sustained transfer limits. Our file transfer test runs a bit slower because of the additional overhead from copying hundreds of small files within a 2GB folder.

Still, if you don't care about bundled software and just want wicked fast external speeds without the limited availability and extra power cord of eSATA, the My Book 3.0 rocks. ▲

by William Van Winkle

Benchmark Numbers	Western Digital My Book 3.0
ATTO Disk	Read / Write (MBps)
4K	34.2 / 37.9
64K	133.5 / 131
8MB	132.7 / 133.8
PCMark Vantage HDD suite	5551
2GB folder transfer	74.1MBps (read) / 86.9MBps (write)

Note: Results reflect running the bundled USB 3.0 adapter from our Intel board's x4 and x16 PCI-E slots, which use PCI-E 2.0. First-gen PCI-E slots will yield lower results.

Specs: Capacity: 1TB; Interface: USB 3.0; Dimensions: 6.5 x 1.9 x 5.3 inches (HxWxD); Weight: 2.6lbs.
Test system specs: CPU: Intel Core i7-965 Extreme; Motherboard: Intel DX50SO; SSD: Intel X25-M 80GB (50nm)

TekNmotion PulseWave 2

Some people look stunning simply rolling out of bed. Other people, to put it in technical terms, benefit from a fair bit of post-processing. The Creative and Logitech headsets we reviewed last month (see page 15) fall into the former category. TekNmotion's PulseWave 2 practically defines the latter. This is one of the few times we've heard bundled headset drivers deliver far better results than our standard Creative X-Fi output.

Out of the box, our preproduction PulseWave 2 has some of the most neutered, anemic audio we've ever heard from a gaming headset. However, by using the C-Media drivers to boost the mids, curve the bass and treble nearly to their peak (though not all the way because the speakers will start to distort), and enable the 7.1 speaker effect, the PulseWave actually sounds decent. Switching back to the Creatives or Logitechs will remind your ears how things should sound, however. Absent any comparisons, though, the PulseWave 2 justifies its $60 tag.

Does TekNmotion deliver on the 7.1 surround promise? Not at all, but that's very common. We found that enabling 7.1 only served to extend the set's fidelity a bit and bring the sound slightly more level with our ear, closer to the speakers being at 9 and 3 o'clock. By default, we felt as if the PulseWaves were playing from 8 and 4 o'clock. So although the sound and clarity in movies and games vary from fair to pretty good depending on the content, don't expect any real spatial distinction.

The bass-cued vibration feature enabled through the remote is annoying, and the dancing red/green/blue LEDs on the cans belong at a roller skating party. We found the set heavy and uncomfortable after about 30 minutes, in part because the cups aren't quite large enough to cover large ears. Young gamers should be impressed with the PulseWave's features and affordability. Players with discerning ears will want a higher-end design. ▲

by William Van Winkle

PulseWave 2
$59.99
TekNmotion
www.teknmotion.com

Specs: Frequency response: 20Hz to 20kHz (speakers), 50Hz to 16kHz (mic); Impedance: 32ohm (speakers); Sensitivity: 102dB (speakers), -58dB (mic)

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ● ● ◖ 2.5 = ABSOLUTELY AVERAGE | ● ● ● ● ● 5 = ABSOLUTELY PERFECT

Alienware Area-51

If there's a boutique system builder that made a name for itself over the years by building top-quality killer gaming rigs with eye-catching designs, it would have to be Alienware. In fact, Dell was obviously so impressed by the company's ability to deliver breakout products that it decided to buy Alienware back in 2006. Since then, Dell's design team has slowly been assimilating the aliens, and the designs that are emerging now have taken on a distinctly different, though perhaps just as striking, look. Of course, with mother ship Dell securing early access to the latest Intel has to offer, the culmination of efforts from the Alien nation recently resulted in an impressive incarnation of the Area-51 series desktop based on Intel's new Core i7-980X six-core processor.

Intel's Gulftown 32nm 6-core processor has been filtering down to major system builders, with offerings showing up in abundance. Alienware took the opportunity to infuse its top-end Area-51 gaming rig with the latest Core i7-980X Extreme processor and in traditional fashion decided to watercool the beast with what looks to be a private-label, Alienware-branded version of the Asetek LCLC self-contained watercooler. The Area-51's chassis weighs in at a bone-crushing 84lbs. The outer shell is built from heavy gauge painted aluminum with two color choices, called "Lunar Shadow" (sort of a gunmetal gray) or "Cosmic Black." A slight push on the glowing alien face logo drops the front panel down to expose the optical drive and other front-facing bays, while depressing a top-panel door reveals USB, FireWire, eSATA, and front-panel audio ports.

Area-51
$4,369
Alienware
www.alienware.com
● ● ● ●

Beyond the usual AlienFX user-customizable case lighting (software controlled), the machine also has a motorized vent system that can be configured to open wider as fan speeds spool up, depending on a certain temperature threshold. Another stand-out feature of the chassis design is the six drive bays set up on the right side panel of the case itself. Just swing open the right panel door, and six 3.5-inch SATA bays are ready to be populated. The cage has quick-release mechanisms that, though not enabled to be hot-swappable, offer very easy access for hard drive installation and removal. All told, the build quality and fit and finish of the chassis are impressive, functional, and just plain head-turning.

Once inside the case, we were treated to a component selection and build quality that is best-of-class currently amongst even the most specialized boutique system builders. The motherboard area as well as the back-side drive cage are illuminated with blue LEDs that shine when the side panels are open, even if the system is off and unplugged from a power source, which makes tinkering around inside that much easier.

Performance-wise, there's little question that the combination of Intel's Core i7-980X and a pair of AMD ATI Radeon HD 5970 graphics cards currently offers just about as much gaming and general compute horsepower as you can find on the market. It's all packaged up in an enclosure that is engineered so well and looks so good your geek friends and significant other might turn alien green with envy.

Speaking of green, the Area-51 is definitely one of the pricier options on the market. But with design and build quality and features like this, it's certainly arguable that you get what you pay for. ▲

by Dave Altavilla

Specs: CPU: Core i7-980X @ 3.8GHz; Memory: 6GB Elpidia DDR3-1333; Motherboard: Dell custom X58-based motherboard; Storage: 2x Seagate Barracuda 7200.12 1TB HDD (RAID 0); GPU: 2x ATI Radeon HD 5970 (CrossFire X); Windows 7 Home Premium 64-bit

Benchmark Numbers	Alienware Area-51
PCMark Vantage Overall	14,029
Cinebench R10	
Multithreaded	33,477
3DMark Vantage	
Performance Preset Overall	32,767
Extreme Preset Overall	21,265
GPU Score	20,850
CPU Score	34,212
Dirt 2 (DX11, Ultra HQ)	
1,920 x 1,200, 8XAA	133.3
2,560 x 1,600, 2XAA	115.3
2,560 x 1600, 4XAA	112.2
Batman Arkham Asylum	
1,920 x 1,200, 4XAA	139
1,920 x 1,200, 8XAA	67
2,560 x 1,600, 4XAA	78
Crysis v1.2 (High Quality)	
1,920 x 1,200, No AA	135.7
2,560 x 1,600, 4XAA	86
Far Cry 2 (Ultra High Quality)	
1,920 x 1,200, 8XAA	145.9
2,560 x 1,600, 4XAA	79
Top Stable CPU Overclock	4.3GHz

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ● ● ◖ 2.5 = ABSOLUTELY AVERAGE | ● ● ● ● ● 5 = ABSOLUTELY PERFECT

Logisys Zaria A10 $89.99 (A10 Deluxe $99.99) | **Logisys Zaria A20** $89.99 (A20 Deluxe $99.99) | Logisys | www.elogisys.com

Logisys Ikonik Zaria A10 & A20

Subtle Yet Stylish Roomy But Compact

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Subtle yet stylish, roomy but compact, the Logisys Zaria A-Series puts Logisys squarely in a sweet spot for a broad cross-section of users.

The steel midtower duo, available in Hazy Silver or Charcoal Black, differs primarily in its brushed aluminum fascia design. A big, filtered 140mm fan creates positive air pressure across your ATX or microATX motherboard. Meanwhile, a 120mm exhaust unit and your own PSU (not included) balance out the ventilation flow.

Logisys' optional SIM (System Intelligent Management) software regulates fan speeds according to temps in up to five thermal zones inside the chassis. A mesh screen on the side panel can help keep everything cool and thus quiet, although you can opt for an acrylic window to show off your gear.

Speaking of quiet, the five 3.5-inch drive bays are muffled with rubber, as is the power supply mount. Logisys also engineers the quartet of optical drive bays to provide further insurance against vibration and noise.

Other cases may address more specialized enthusiast needs, but there's no doubt that the Logisys Zaria A-Series covers the bases for everyday computing and family/friend builds. ▲

advertisement

Unleash The Beast

Lynnfield Core i5-750 Overclocking

Mainstream computer components that fall just shy of the mark set by much more expensive parts almost always have a special appeal to modders and power users. Knowing that a certain mainstream component is potentially only a few mods away from performing as good as, or maybe even better than, a higher-end part can sometimes make them very difficult to resist. Otherwise unsuspecting PC parts may even rise to legendary status amongst enthusiasts, such as the Celeron 300a, for example. Ah, the good ol' days . . .

Some of the hottest mainstream components to hit the scene recently are Intel's Lynnfield-based Core i5 and Core i7-800 series processors. Although Lynnfield-based processors aren't simply lower-clocked duplicates of the higher-end Bloomfield-based original Core i7 series processors (they lack support for triple-channel memory configurations, for example), in some ways Lynnfield-based processors are actually more advanced from a technological standpoint. With Bloomfield, Turbo Mode allowed the chips to operate at one or two speed-bins above their "stock" frequencies. But with Lynnfield, Turbo Mode is much more flexible and allows the chips to operate at up to five speed bins above stock, power and thermals permitting. And they have integrated PCI-E connectivity, too.

The mainstream nature of Lynnfield-based Core i5 and Core i7-800 series processors also makes some of them much more affordable than their Bloomfield-based cousins. The quad-core Core i5-750, for example, which also lacks support for Hyper-Threading, can be had for under $200. As such, the i5-750, a solid P55-based motherboard, and some decent DDR3 are the basis of an extremely powerful system at a relatively affordable price.

Of course, we mention the Core i5-750 here for a reason. It turns out these processors are quite overclocker-friendly and, with a little tweaking, can be pushed well beyond stock frequencies. With a sub-$200 price tag, and one of Intel's most cutting-edge processor microarchitectures at its heart, the Core i5-750 just begs to be modded and overclocked. So that's exactly what we did.

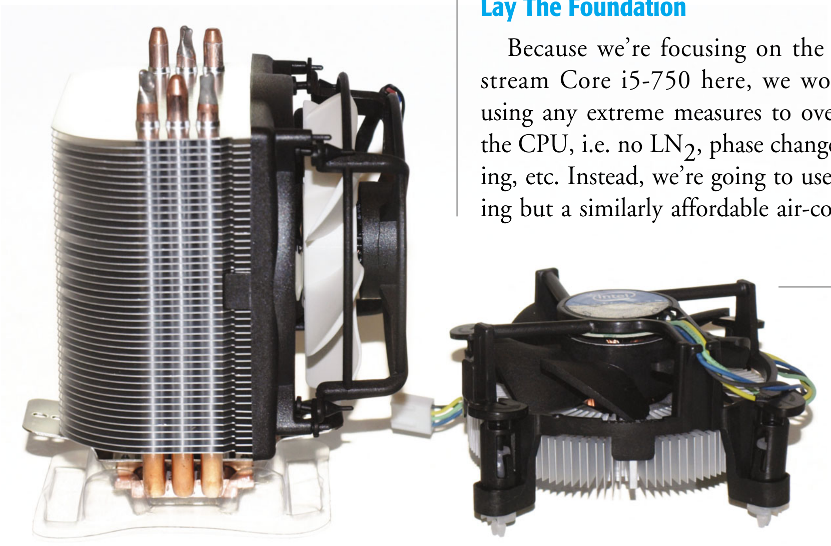
Lay The Foundation

Because we're focusing on the mainstream Core i5-750 here, we won't be using any extreme measures to overclock the CPU, i.e. no LN_2, phase change cooling, etc. Instead, we're going to use nothing but a similarly affordable air-cooler, a little elbow grease, and some down-and-dirty voltage and base clock tweaks.

Retail editions of the Core i5-750 include a basic HSF (heatsink and fan) combo that's fine for stock applications. But unlike the larger coolers included with Bloomfield-based Core i7s, the Core i5's HSF is downright tiny.

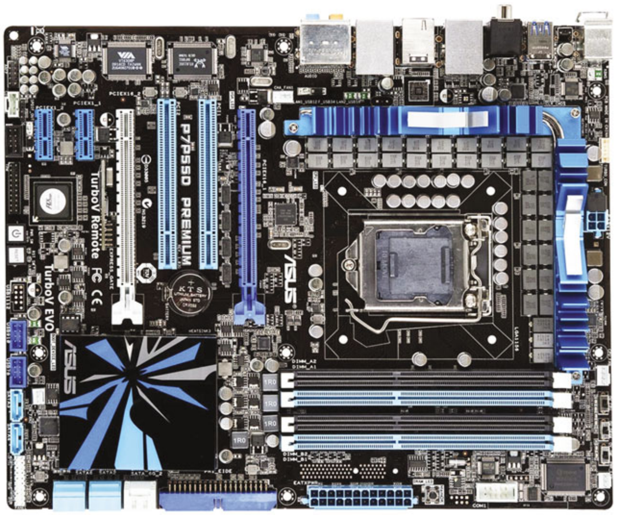
With that in mind, we set out to find a much higher-performing, but also somewhat cheap, cooler for the Core i5. Ultimately, we chose the Arctic Cooling Freezer 7 Pro Rev. 2. The cooler features a tall, tower-type aluminum heatsink assembly linked to a thick, solid copper base via three copper heatpipes. A nearly silent 92mm fan cools the unit. For under $40, the Freezer 7 Pro Rev. 2 is a huge step up from the stock Intel i5-750 HSF and well worth the investment for Lynnfield overclockers who also happen to be on a budget.

Any overclocking endeavor would be fruitless without a good motherboard, so for our experiment we enlisted the help of the Asus P7P55D Premium. This board has a BIOS that's jam-packed with features geared toward overclockers. It also has more than sufficient cooling for its VRM and chipset. At around $200, the P7P55D Premium is somewhat expensive, but other members of Asus' P7P55D family, which feature similar BIOS options, can be had for much less.



The stock cooler included with Intel's Lynnfield-based Core i3, i5, and i7 series processors is fine for default operation, but it lacks the surface area necessary to dissipate the additional heat generated while overclocking. As such, we'd recommend a good aftermarket cooler for Lynnfield overclocking, such as the Arctic Cooler Freezer 7 Pro Rev. 2 we used. It's relatively cheap and does the job well.

Prior to any overclocking, we updated the board's BIOS to ensure it was up-to-date. When a relatively new chipset such as the P55 Express is released, it's not uncommon for motherboard manufacturers using the chipset to have some kinks and bugs to work out over the first few months of its availability in order to optimize performance.



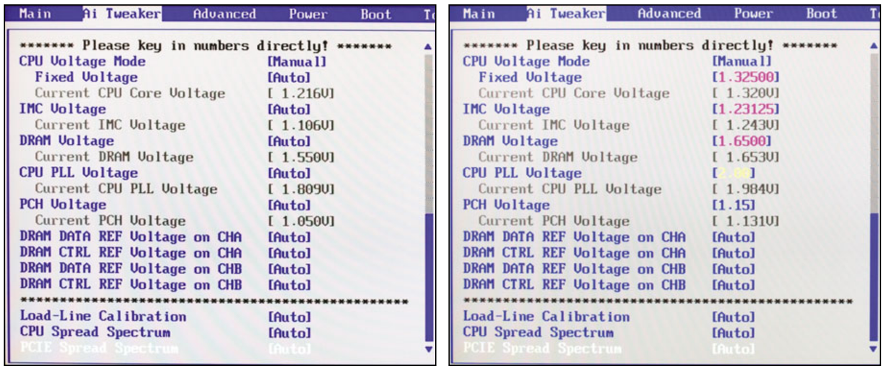
No amount of prep work or skill will help when overclocking a processor if you're using a lackluster motherboard that isn't designed for the job. For our Lynnfield overclocking experiment, we used the aptly named Asus P7P55D Premium, which is built around Intel's P55 Express chipset. The P7P55D Premium gives users the ability to overclock via the system BIOS or a Windows-based utility. We went old-school and used the BIOS.

The Hard Mods

It's been awhile since we discussed lapping and polishing a processor's IHS (integrated heat spreader). The process entails carefully sanding and polishing the IHS' surface until it is perfectly flat and has a mirror-like finish. It isn't always necessary to sand down the IHS, however. Take the CPU and hold something perfectly flat and straight, such as a razor blade or metal ruler, upright across the heat spreader's surface. If there are no gaps between the straight edge and IHS, then there's little reason to lap the surface. Our processor's IHS was flat, so we moved directly to polishing. If yours isn't perfectly flat, see "Life In The Fast Lane" on page 68 in the May 2008 issue for a detailed tutorial on lapping the IHS.

Using a wadding metal polish, evenly buff the IHS' surface in a back-and-forth motion as you slowly work your way from one side to another. Then, turn the CPU 90 degrees and repeat the polishing process until the surface of the IHS has a mirror-like finish. In most cases, the entire process shouldn't take longer than an hour. And when you're done with the CPU, do the same thing to your heatsink's base. The idea is to remove as many tiny imperfections in the metal as possible to maximize the contact area between the IHS and heatsink, which, in turn, will maximize heat transfer.

To further ensure proper contact and maximum heat transfer, the use of a quality thermal paste is also a must. Before applying the paste, though, we like to prime the processor's IHS and the heatsink base to really fill in tiny imperfections in their respective surfaces. To prime the surfaces, put a small dab of thermal paste—maybe the size of a BB—on them and buff it into the metal using a circular motion with a piece of paper towel. When done, the surface will have an ever so slightly visible haze. That haze is small amounts of thermal paste filling in tiny holes in the metal. To finish, apply an ultra-thin layer of thermal paste to the processor's IHS and then mount your cooler.



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******* Please key in numbers directly! *******
CPU Voltage Mode                     [Manual]
  Fixed Voltage                      [Auto]
  Current CPU Core Voltage           [ 1.216V]
IMC Voltage                          [Auto]
  Current IMC Voltage                [ 1.106V]
DRAM Voltage                         [Auto]
  Current DRAM Voltage               [ 1.550V]
CPU PLL Voltage                      [Auto]
  Current CPU PLL Voltage            [ 1.809V]
PCH Voltage                          [Auto]
  Current PCH Voltage                [ 1.050V]
DRAM DATA REF Voltage on CHA         [Auto]
DRAM CTRL REF Voltage on CHA         [Auto]
DRAM DATA REF Voltage on CHB         [Auto]
DRAM CTRL REF Voltage on CHB         [Auto]
*************************************************
Load-Line Calibration                [Auto]
CPU Spread Spectrum                  [Auto]
PCIE Spread Spectrum                 [Auto]
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```
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******* Please key in numbers directly! *******
CPU Voltage Mode                     [Manual]
  Fixed Voltage                      [1.32500]
  Current CPU Core Voltage           [ 1.320V]
IMC Voltage                          [1.23125]
  Current IMC Voltage                [ 1.243V]
DRAM Voltage                         [1.6500]
  Current DRAM Voltage               [ 1.653V]
CPU PLL Voltage                      [2.00]
  Current CPU PLL Voltage            [ 1.984V]
PCH Voltage                          [1.15]
  Current PCH Voltage                [ 1.131V]
DRAM DATA REF Voltage on CHA         [Auto]
DRAM CTRL REF Voltage on CHA         [Auto]
DRAM DATA REF Voltage on CHB         [Auto]
DRAM CTRL REF Voltage on CHB         [Auto]
*************************************************
Load-Line Calibration                [Auto]
CPU Spread Spectrum                  [Auto]
PCIE Spread Spectrum                 [Auto]
```

Significantly overclocking a Lynnfield-based Core i5-750 processor is as quick and easy as tweaking a few voltages and the CPU's base clock frequency via the system BIOS, provided the chip is adequately cooled. In our case, with a $39 aftermarket air cooler, we were able to take an i5-750 from its stock frequency of 2.66GHz all the way up to 3.93GHz–an increase of almost 48%.

The Soft Mods

With our motherboard's BIOS up-to-date, our cooler's base and IHS polished and primed, and everything mounted and ready for business, we were ready to start overclocking. Due to the fact that the Core i5-750 is a "locked" processor, and higher multipliers cannot be selected manually, it can only be overclocked by altering the motherboard's base clock, or BCLK, frequency. On most P55 boards, it should be labeled correctly in the BIOS, but the base clock may also (incorrectly, we might add) be labeled FSB.

By default, the base clock will be set to 133MHz. Everything on the board, from the CPU to memory, derives its clock speed using some multiple of the base clock. For example, the Core i5-750 has a default clock speed of 2,660MHz, which is derived by multiplying 20 (the i5-750's stock multiplier) by 133MHz.

Before altering the base clock, however, a bit of extra voltage is in order. We upped the voltage to our CPU, its PLL and integrated memory controller, and the chipset. Typically, a voltage increase of around 8 to 10% is safe if a system is adequately cooled. We should point out, however, that exceeding 1.65V for the memory is not advisable for Intel processors with integrated memory controllers.

With the voltages set, it's time to increase the base clock. Raise the base clock frequency 5 or 10MHz at a time, save the changes; boot into Windows, check temps, and test the system for stability using an application that will put a load on the CPU, such as Prime95 or Sandra's burn-in wizard. Repeat the process until the system becomes unstable and then back off the base clock until the system is stable again. Also note that, in our opinion, the CPU temperature shouldn't exceed 80 degrees Celsius. Even if the system is stable, if temps are too high, it's best to further enhance the system's cooling or leave well enough alone.

While altering the base clock, also pay attention to your final memory frequency and change the DRAM multiplier as necessary to remain within your memory's rated frequency range. Ultimately, we were able to hit a stable 196MHz base clock for a final CPU frequency of 3.93GHz.

Zipping Along

As the sidebar will show, modding a Core i5-750, investing in a decent cooler, and overclocking the heck out of the thing is well worth it. We were able to take a $200 CPU and make it perform like a $1,000 benchmark buster. No matter how you slice it, that's not a bad result (unless you have a thing for warranties). ▲

by Marco Chiappetta

Performance: Before & After The Mod

We tested our modded and overclocked Core i5-750 using a number of popular benchmarks to see just how much horsepower could be coaxed out of the chip with a little help from our mods. In the chart below, we test the i5-750 in its stock configuration with a 2.66GHz default frequency and Turbo Mode enabled, and we also test it while overclocked to 3.93GHz with Turbo Mode disabled. For comparison, we have included scores from a high-end Core i7-965 Extreme Edition.

So, was the overclocked Core i5-750 able to close the performance gap between it and the much more expensive Extreme Edition? You bet it was. In a few of the highly parallelized benchmarks, the Core i7-965 Extreme Edition's Hyper-Threading feature, which lets the CPU process up to eight threads simultaneously, gives the chip a huge advantage. Even with an additional 1.3GHz of clock, the i5-750 can't match the i7-965 in benchmarks such as POV-Ray, Kribibench, and Sandra's floating point test. However, in all of the other benchmarks, the modded and overclocked i5-750 finished between 3 and 27% ahead of the i7-965 Extreme Edition. The largest gains were realized in the LAME MT, Cinebench, and Crysis tests, where the overclocked i5-750's increased compute performance and memory bandwidth come into play.

Test systems: Core i5-750, Asus P7P55D Premium, GeForce GTX 280, 4GB (2x 2GB) Corsair DDR3-1600, WD Raptor 150GB HD, Windows 7 Ultimate x64

Core i7-965 Extreme Edition, Gigabyte EX58A-UD5, GeForce GTX 280, 6GB (3x 2GB) OCZ DDR3-1600, WD Raptor 150GB HD, Windows 7 Ultimate x64

	Stock Core i5-750 (2.66GHz)	Overclocked Core i5-750 (3.93GHz)	Stock Core i7-965 Extreme (3.2GHz)	Percent Difference (Overclocked Core i5-750 vs. Core i7 965-Extreme)
Base Clock Frequency	133MHz	196MHz	133MHz	
Memory Frequency	1,333MHz	1,574MHz	1,066MHz	
SiSoft Sandra 2009 SP4				
Processor Arithmetic				
Dhrystone iSSE4.2	63.83 GIPS	87.44 GIPS	84.88 GIPS	+3.0%
Whetstone iSSE3	33.15 GFLOPS	43.6 GFLOPS	74.61 GFLOPS	-71.1%
Processor Multimedia (Mpixels/s)				
Integer x8 iSSE4.1	120.5	165	149	+10.8%
Floating Point x4 iSSE2	92.27	126.47	120	+5.2%
Memory Bandwidth (GBps)				
Integer Buffered iSSE2	16.84	19.84	18	+8.3%
Floating Point Buffered iSSE2	16.87	19.81	18	+8.2%
Futuremark 3DMark06				
CPU Benchmark	4,459	6,164	5,562	+10.8%
LAME MT MP3 Encoding*				
Single-threaded	0:43	0:31	0:37	+19.3%
Multi-threaded	0:29	0:21	0:25	+19.1%
Cinebench R10				
Single-threaded	4,072	5,582	3,902	+43%
Multi-threaded	14,506	20,055	15,680	+27.09%
KribiBench v1.1**				
Sponge Explode Model	14.55	20.81	28.17	-35.3%
Ultra Model	4.31	6.06	7.28	-20.1%
POV-Ray***				
Multi-threaded	2,752	3,795	4,340	-14.4%
Crysis SP Demo**				
CPU test (800 x 600, low quality)	154.62	195.6	179.85	+8.6%

*minutes:seconds **fps ***pixels per second newegg.com®

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[1] HD-capable monitor required [2] Blu-ray drive required [3] Windows® 7-capable system required [4] 10-bit display required

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Mad Reader MOD

Dragon Blood

Placing sixth in *CPU*'s case mod contest at PDXLAN 14 inspired Larry Anderson to try, try again. We appreciate his determination, but we appreciate the results even more. Anderson went to work and came back to PDXLAN 15 with his Dragon Blood mod, which managed to best even the ridiculously tough competition that is typical of PDX contests.

It's easy to see why; the case is gorgeous, incorporating some of the best woodworking we've seen in a mod with solid design, a very clean interior, and clever use of red coolant to shine through the clear etched side panel, symbolizing the blood of the dragon.

Anderson says he spent about three months in the planning stage and about another 20 hours or so on construction once he had all the materials he needed for the build on hand. He got much of what he needed to build his case at Danger Den, but he also chose to use some pretty exotic wood, including wenge, a dark wood from Africa, and curly maple.

Anderson has an elaborate woodworking setup in his garage and says he inherited much of his talent and enjoyment for woodworking from his grandfather, who was very skilled.

"Growing up, I often looked at my grandfather and the natural abilities he had. At PDXLAN 14, I saw a wooden Danger Den case and I instantly knew I had to design my own wood case. Since my two favorite hobbies are woodworking and computers, it was one of the coolest projects I've ever been able to spend time on."

Dragon Blood is powered by an Intel Core i7-920 overclocked to 3.6GHz, an Evga X58 motherboard, 6GB of Corsair Dominator DDR3-1600, two Evga GeForce GTX 295s (yep, that's Quad SLI), and a Corsair HX1000 PSU. Anderson keeps all that stuff cool with a full-blown Danger Den cooling system, including CPU, chipset, and GPU blocks.

His success with Dragon Blood has him so fired up that he's ready to take his modding abilities to the next level.

"I plan to start another computer but haven't completed the design yet. My third project will be unlike anything anyone has ever seen."

Judging by his progression from his first project to the Dragon Blood mod, we're inclined to believe him. ▲

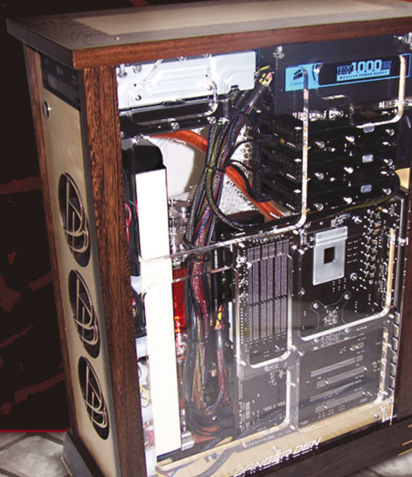
Give Us Your Mod

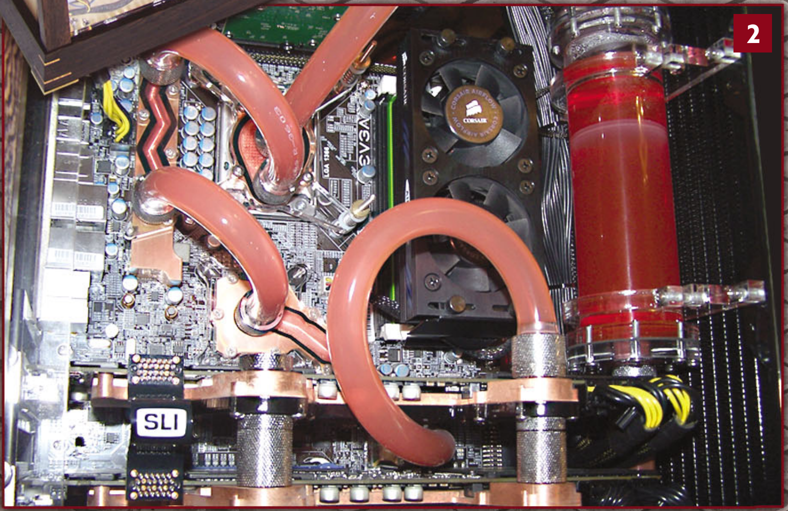
Have a computer mod that will bring tears to our eyes? Email photos and a description to madreadermod@cpumag.com. If we include your system in our "Mad Reader Mod" section, we'll send you $1,500 and a one-year subscription to CPU.

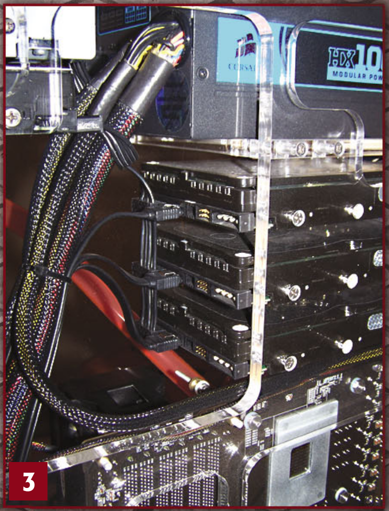
1) Thanks to a clear acrylic right-side panel, you can see that Dragon Blood is nearly as neat behind the motherboard as most builds are in front of it.

2) Dragon Blood clearly demonstrates Anderson's attention to detail and skill in planning a build. There's room for everything in here, but just enough.

3) Anderson put a lot of emphasis on the chassis and his CPU, graphics cards, and memory, but don't think that he skimped on storage. Dragon Blood boots from a RAID 0 array consisting of three Western Digital Raptors, and it has a 1TB Western Digital Caviar Black for backup.







advanced Q&A corner

Get informed answers to your advanced technical questions from *CPU*. Send your questions along with a phone and/or fax number, so we can call you if necessary, to q&a@cpumag.com. Please include all pertinent system information.

Using Remote Desktop is very easy, but there are some pitfalls to contend with related to firewalls, network ports, and other security issues.

Each month we dig deep into the CPU *mailbag in an effort to answer your most pressing technical questions. Want some advice on your next purchase or upgrade? Have a ghost in your machine? Are BSODs making your life miserable?* CPU*'s "Advanced Q&A Corner" is here for you.*

Chris R. asked: **I bought a Patriot Torqx SSD a few weeks ago to use as a boot drive for my main PC. I haven't gotten around to fully installing it yet, though, because I'm too lazy to reinstall all of my applications and switch to Windows 7 at the moment. In the meantime, I've had it temporarily connected to my PC so I could run some benchmarks and just experiment with it for fun. What I've noticed, though, is that the drive has gotten really slow since I first installed it. Read speeds are about the same, maybe a little slower, but writes went from about 140MBps to about 30MBps! I have tried reformatting and repartitioning the drive, but it's still not performing well. Did I fry something running all of these benchmarks on the thing?**

A: We doubt you fried anything, Chris. It's more likely that running a variety of benchmarks on the drive with different access patterns has put it into a "dirtied" state, which can drastically affect write performance. With most current solid-state drives, when a block is dirty, it must be fully read into system memory, modified, and then rewritten to the drive; a blank block can simply be written to. The read-modify-write operation of a dirty block, however, can drastically slow things down.

With some benchmarks, even though the drive may show almost no used space to the OS, the blocks have been dirtied by orphaned data during the benchmark run. Garbage collection algorithms and TRIM will remedy the situation if your drive supports the features and is installed under Win7, but it doesn't sound like they're helping with your current configuration. Because your drive is blank right now, we'd recommend flashing it to the latest firmware available on Patriot's Web site (www.patriotmemory.com) and then performing a secure erase operation. Flashing to the latest firmware will ensure your drive is programmed with the latest garbage collection algorithms and potentially add support for TRIM. A secure erase will then completely blank

Performing a secure erase is sometimes the best way to restore a solid-state drive to like-new condition and achieve maximum performance.

the drive, erasing all data from every block, returning it to like-new condition.

To flash the drive's firmware, simply follow the instructions on Patriot's Web site. To do a secure erase on the drive, search the Web for a copy of HDDErase 3.3. (Newer versions are available but aren't always compatible with SSDs.) Then put a copy of HDDErase 3.3 on a bootable floppy or thumb drive. Connect your SSD and set your motherboard's SATA controller to legacy IDE mode. Then, boot to the floppy or thumb drive containing HDDErase, run the program from the DOS prompt (the executable is "HDDErase"), select your SSD, and follow the on-screen prompts to perform a secure erase. The entire process should take no more than a few minutes and will restore the drive's performance.

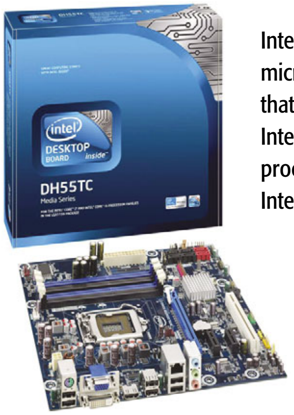
Jimmy Z. asked: **I'm looking into building an HTPC with fairly standard Media Center capabilities, a wireless keyboard, and mouse. I was initially thinking of picking up a Blu-ray player, but the way I see it, I can probably do one better by building a small, moderately powered PC with an internal Blu-ray drive. The nice thing about a full PC is that it will also come with a bunch of other features that the Blu-ray player won't, obviously, like Web browsing, video streaming, and maybe even some light gaming, if I can find a decent graphics card that doesn't drain too much power or get too hot.**

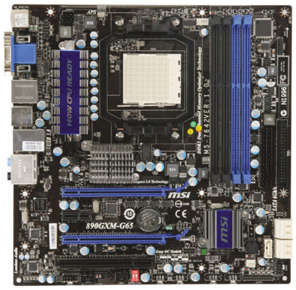
I have some HTPC cases in mind and think I'd like to go with something that will blend in with my other stereo components. As a result, I'll have a bit more room for a build that can fit into a microATX form factor, though height restrictions might be something I have to watch out for. I'd love any advice you could offer on what you might recommend for a base system platform, processor, graphics card, and other primary components.

A: We would wholeheartedly echo your sentiments on building an HTPC, Jimmy. In fact, with the explosion of media-rich content on the Internet these days, and the sharp decline in Blu-ray drive prices, it makes even more sense going the HTPC route over dedicated video components. And as streaming services such as Netflix, Boxee, Hulu, and others continue to offer more HD content, the writing is on the wall that convergence in the living room will go well beyond just the DVD player.

From a platform perspective, your timing couldn't be better, as there are a bunch of new, low-power, highly integrated processors and motherboard chipsets from Intel and AMD that have hit the market over the past few months.

From Intel's offering, we'd recommend going with one of the new Core i5-600 series or Core i3-500 series dual-core processors, along with either an Intel H55 Express or H57 Express chipset-based motherboard. In the microATX form factor, Intel's own DH55TC "Tom Cove" board has a lot to offer. The board is equipped with a full PCI-E x16 graphics slot, a pair of PCI-E x1 slots, and a legacy PCI slot, along with the standard complements of 8-channel HD audio, Gigabit Ethernet, and up to 12 USB 2.0 and six SATA 3Gbps ports. Of course, Intel's Arrandale-based Core i5 and Core i3-500 series processors offer on-chip Intel HD Graphics, so this board also comes equipped with HDMI, dual-link DVI, and VGA outputs. The only options this board is missing, in our opinion, are an eSATA port and perhaps USB 3.0 support for external storage expansion options.


Intel's DH55TC is a microATX motherboard that supports the latest Intel Core i5 and Core i3 processors with integrated Intel HD Graphics.


MSI's 890GXM-E65 motherboard is a virtual Swiss Army Knife of the latest in chipset technology, including integrated AMD ATI Radeon HD 4920 graphics, 6Gbps SATA, and USB 3.0 connectivity.

By the way, if you'd consider a smaller Mini-ITX motherboard, Intel's H57 Express-based DH57JG has eSATA onboard as well as 10-channel surround sound. In terms of your multimedia requirements, Intel's integrated HD Graphics engine is fine for Blu-ray playback and other 1080p video. In fact, CPU utilization was quite low when we tested the platform under several HD video playback scenarios.

AMD also recently launched its 890GX motherboard chipset with integrated graphics. The chipset is also one of the first to offer native 6Gbps SATA support. Take a look, for example, at MSI's 890GXM-G65 microATX motherboard. It's nicely decked out with all the trimmings, including up to 10-channel surround HD audio, four USB 2.0 ports and two USB 3.0 ports, an eSATA port, HDMI/DVI/VGA video outputs, and Gigabit Ethernet. The board also has two full-length PCI-E x16 slots that can run a pair of Radeon graphics cards in CrossFire (two by x8 connected), an x1 PCI-E slot, and a legacy PCI slot. Couple this board with a Phenom II X2 dual-core or Athlon II X4 quad-core processor, and you have the makings of a nice HTPC. The processors themselves might not have quite the punch as Intel's Core i5 chips, but they'll offer more than enough juice for your purposes in an HTPC. Also, the 890GX's integrated Radeon HD 4920 graphics core is about on par performance-wise with Intel's HD Graphics integrated graphics.

> Intel's and AMD's integrated graphics might be fine for an occasional round of World of Warcraft or Sims, but for running the latest titles at HD resolutions, you'll need more horsepower.

Now, if you're planning on doing any sort of serious gaming on the machine, we'd suggest filling that PEG slot with a discrete graphics card. Intel's and AMD's integrated graphics might be fine for an occasional round of World of Warcraft or Sims, but for running the latest titles at HD resolutions, you'll need more horsepower.

For graphics cards, you're likely going to be limited to a half-height card if you're building within the confines of the shallow media center chassis that you described. We'd suggest looking at either an Nvidia GeForce GT 240 card or an AMD ATI Radeon HD 5570. The GT 240 is a bit more powerful, and though AMD certainly has other Radeons that offer similar performance in a similar power budget, we've yet to find anything more powerful in a half-height card than the 5570. Regardless, either of these cards will let you run at playable frame rates at HD resolutions in some of the latest titles on the market, including first-person shooters and the like. In less demanding titles, you might even be able to turn up image quality settings to their max levels and still maintain playable frame rates. Of course, with the MSI motherboard we noted above, you could potentially drop in two ATI Radeon HD 5570 cards if your chassis's slot configuration accommodates them, which would offer you more than enough firepower for gaming on the big screen with all the eye candy turned on. Decisions, decisions, eh Jim?

Jeremy H. asked: **I'm dealing with an annoying problem at work. I'm employed part-time by a local, city-owned marina, where we sometimes have to help maintain customers' boats that are docked out on the water. We have a wireless network setup that covers the entire harbor, and we take notebooks that connect to a server out with us when necessary. All we really do is enter data into a simple accounting program when there are additional fees we must bill to customers, but we sometimes have connection issues that result in database corruption. On occasion, the wireless connection will drop while we're making entries, and then we can't do any more work from the notebooks that day. When the connection drops while we're saving changes, the program throws an error when we reconnect that the database is corrupt, and we can't do anything again until we physically get in front of the server to restore that morning's backup database file.**

It's not a huge deal because we only make a few entries per day at the most, but I'd really like to fix this problem so we can stop worrying about it once and for all. Any ideas how to solve this one?

A: This is actually a relatively simple problem to work around, provided you have the necessary hardware. Many simple networked database programs, such as the one you seem to be describing, don't have built-in mechanisms to deal with corrupt data being sent by a client machine. As such, when your wireless connection acts up, bad data is being entered into the database, and you're greeted by those lovely error messages. The easiest way to work around a problem like the one you're having is to not directly connect to the server over the wireless network. Let us explain.

Instead of using the wireless notebook to actually run the accounting program from the server, use it to remote into a wired client machine that will be running the app. If only one user at a time connects, all you'll have to do is enable Remote Desktop on the wired client machine on your network and use its IP address to connect to it remotely from the wireless notebook. (If more than one user must connect simultaneously, though, a server-class OS may be required.) You'll be able to input data on the wired client machine from the wireless notebook, but because the wired machine is actually sending the data to the server, you're far less likely to send any corrupt data, even if the notebook has connection problems while saving.

Using Remote Desktop is very easy, but there are some pitfalls to contend with related to firewalls, network ports, and other security issues. We'd suggest working with your network admin to perform the necessary installs (if that's not you) and hitting up Microsoft's knowledgebase for some background information, as well. Good luck. ▲

by Dave Altavilla and Marco Chiappetta,
the experts over at HotHardware.com.

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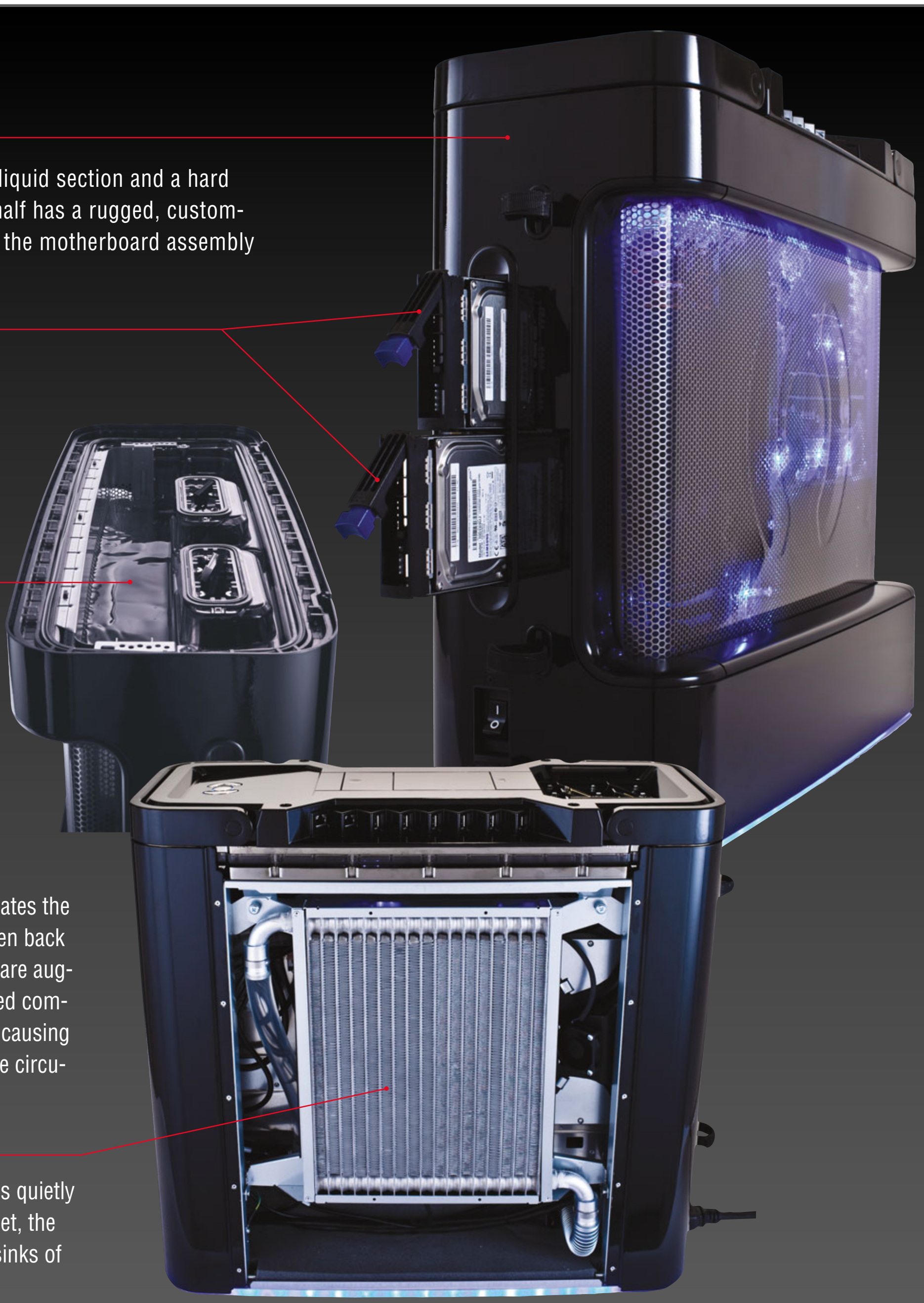
Hardcore Computer Reactor X

The Coolest PC In The World

If you're reading *CPU*, chances are that you're well-versed in the whys and wherefores of air-cooling computing parts with fans and heatsinks. You likely possess at least a passing acquaintance with watercooling circuits and Peltier units, and you may even have seen or even dabbled in liquid nitrogen and/or phase-change (refrigeration) setups.

Time to throw out your baby and its UV-reactive bathwater, so to speak. Hardcore Computer (www.hardcore-computer.com), a boutique builder founded by rather spirited enthusiasts, is



Case

Reactor X's unique case is split into a liquid section and a hard drive/optical drive section. The liquid half has a rugged, custom-made tank that allows easy removal of the motherboard assembly for upgrades.

Dry Drives

Because of their mechanical nature, hard drives and optical drives are not immersed. The former enjoy life on the dry side of the case with hot-swappable drive bays and a cooling fan.

Coolant

This clear, mineral oil-based liquid feels soft, Hardcore says, like hand lotion. The company developed its Core Coolant to be compatible with materials such as capacitor resins, which certain other nonconductive cooling fluids will happily eat away.

Pump

A 150gph (gallons per hour) pump circulates the Core Coolant through the radiator and then back to the CPU, GPU, and PSU(s). Its efforts are augmented by passive convection as unsinked components heat the coolant touching them, causing it to rise. The result: no "hot spots" where circulation breaks down.

Radiator

Four temperature-controlled, 120mm fans quietly move air through the radiator. At the outlet, the cooled oil is pumped directly to the heatsinks of the major heat-producing components.

doing a fair job of making other bespoke PC vendors look pretty undifferentiated from each other.

Hardcore's raison d' être is its liquid immersion cooling technology, which is a little like that used in large, oil-cooled power transformers. In contrast to the closed loop of a common PC watercooling system, which pumps a solution through hoses to sealed waterblocks on certain chips but ignores the heat concerns of the rest of the components, Hardcore's MO in the Reactor X ($5,945 and up) and other systems is to dunk everything that can safely be dunked.

Obviously, the choice of coolant is critical; water would immediately short-circuit the PC's electrical pathways (and possibly you along with them). You need a fluid that is not only electrically nonconductive but tremendously conductive of heat.

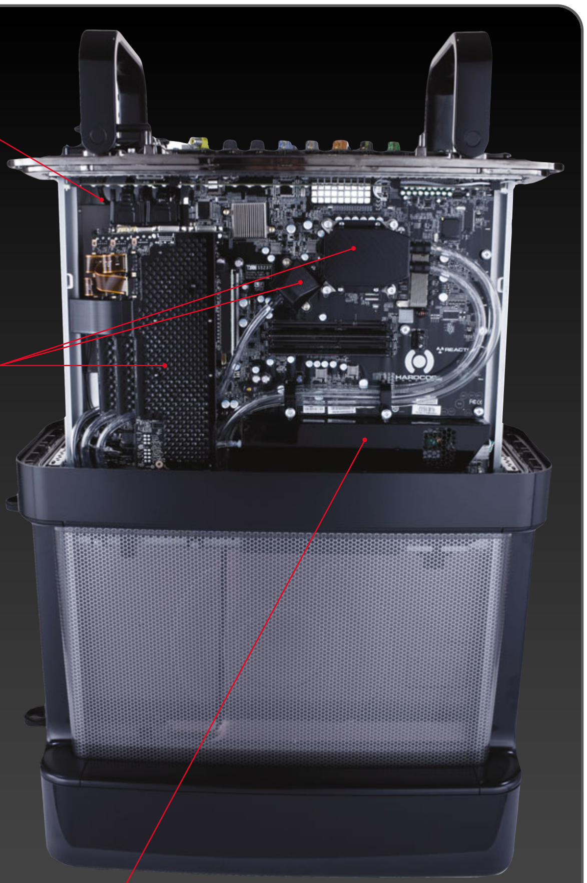
That's Hardcore's Core Coolant in a nutshell. Based on mineral oil, the coolant has as much as 1,350 times the heat transference ability of air, according to the company. And it won't react with any of the substances used to make all the boards and chips in a PC, so it's safe to use.

The upshot to the radical cooling potential of liquid immersion is not only more headroom for overclocking—approximately 25% more than a PC on air, the company says—but also longer life for every chip, cap, MOSFET, and more. Hardcore stresses that systems such as Reactor X provide sustainable performance gains, completely unlike the temporary GHz summits attainable with benchmark busters such as LN2.

And yet, in spite of its custom parts list and submersive nature, Reactor X is largely upgradable. Hardcore Computer provides detailed instructions on how to incorporate new parts such as GPUs, CPUs, and drives. You'll need to source new mainboards, PSUs, and heatsinks from the company itself, however.

Although the Reactor X's price isn't out of line with other high-end boutique offerings, Hardcore does plan to develop and market lower-priced units after its top-end products such as Reactor X make their mark. And after receiving a substantial cash injection shortly before press time, the company stands a decent chance of making this plan a reality. ▲

by Marty Sems



Motherboard

Hardcore's custom, Nvidia 790i-based mainboard eliminates as much cabling as possible with a direct plug-in architecture.

Heatsinks

Because Core Coolant flows differently than air, Hardcore Computer designed heatsinks specifically optimized for its use. Those with inlet hoses from the radiator output their coolant into the common tank.

Hardcore's sinks can be smaller, too, thanks to the coolant's outstanding heat conduction properties. In the case of the juncture between the CPU and its heatsink, a piece of indium is used as a reusable heat transfer interface instead of traditional thermal compound.

Power Supplies

Single or redundant PSUs plug directly into the motherboard.

CLR CMOS/External Ports

Few users would want to fish around in an oil-filled tank to clear their CMOS, so Hardcore wisely moved the battery and BIOS reset switch to the outside of the case.

White Paper: WiGig & Giga-IR

Gigabit Wireless Ramps Up

If nests of cables surrounding your various pieces of technology have long been a sore point in your household, you've undoubtedly discovered the benefits of a few wireless technologies already.

Wi-Fi has been a great benefit for computer users, removing Ethernet cables, allowing you to wirelessly beam data back and forth from the Internet and even to a wireless printer. Some consumer electronics, such as digital cameras and cell phones, can even draw power without the need for wires by using a charging pad such as a Powermat.

The next nest of cables to tackle? They're surrounding your HDTV.

Several wireless technologies are aiming to free your television from the need for cables, allowing you to beam data from your computer to the HDTV at data transfer speeds high enough to allow Full HD-quality video.

Announcements concerning wireless technologies that quickly can move large amounts of data have become common in the past few months. Technologies such as Intel Wireless Display and the Boxee Box provide a wireless connection to the TV for streaming Internet video, for example. The high-speed wireless data transfers aren't limited to the TV, though: WiGig and Giga-IR are the technologies behind high-speed wireless networking and computing hardware that will be available for purchase in 2010 and 2011.

HD Wireless Options

HDTV owners already know the frustration of needing multiple, proprietary cables for all of their home-theater electronics, such as DVRs and Blu-ray players. The cables aren't nice to look at, and it can be frustrating when you can't find the exact cable to make the proper connection. That's where these wireless data transmission technologies intend to step in, alleviating the need for the nest of cables.

Intel Wireless Display. Transmitting HD video wirelessly requires high speeds for uncompressed video. An uncompressed 1080p HD data stream requires 3Gbps, for example. Uncompressed 720p requires about 1.4Gbps.

Intel Wireless Display, which uses Intel My WiFi technology, can send signals about 20 feet in the 2.4GHz and 5GHz bands at speeds of 6 to 8Mbps, meaning it must compress the HD signal. However, it greatly simplifies the process of mirroring the images between your laptop's screen and your HDTV. (See page 51 in the April 2010 issue for more information on Intel Wireless Display.)

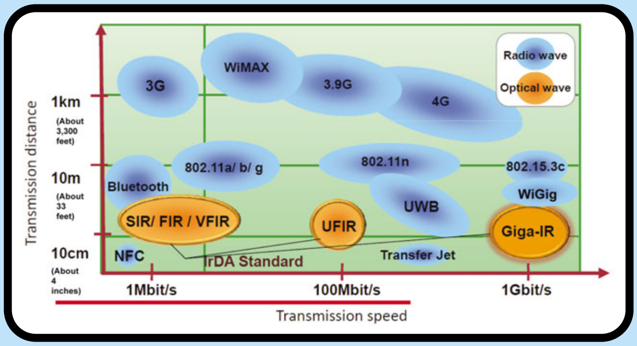
WirelessHD. WirelessHD is more specifically designed for HDMI cable replacement. WirelessHD works over about 30 feet in the 60GHz band and is based on the 802.15.3c specification from the IEEE.

In early January, the WirelessHD Consortium, which consists of many of the same companies that are part of the WiGig Alliance, announced an enhancement to the WirelessHD 1.0 specification that allows support for handheld devices and PCs and which eventually will increase the data rate to between 10 and 28Gbps. (See

Other Wireless Technologies

The gigabit wireless technologies—Giga-IR, WiGig, and WirelessHD (based on the 802.15.3c specification)—represent the highest data transfer rate speeds among wireless technologies. WiGig and WirelessHD both work with transmission distances of about 30 feet, while Giga-IR is limited to a few feet. Some of the other technologies include:

3G and WiMAX. Long-distance transmissions are the key components of these wireless technologies. 3G (and 4G) works well with cellular networks. WiMAX, sometimes called broadband wireless access, is a long-range wireless networking standard aimed at computing.



802.11a/b/g/n. These specifications are Wi-Fi networking specs, designed for use within a building or home. Each of the 802.11 protocols offers a different transfer speed.

Bluetooth. The Bluetooth spec represents a PAN (personal-area network), providing connections between a cell phone and a wireless headset, for example.

SIR/FIR/VFIR/UFIR. Each of these infrared transfer technologies (serial IR, fast IR, very fast IR, and ultra fast IR) works in a similar manner but at different transfer speeds, much like the 802.11 specifications. ▲

Source: IrDA

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page 54 in the May 2008 issue for more information on WirelessHD.)

WiGig. WiGig will also work in the 60GHz band, and it will offer initial transmission speeds of between 1Gbps and 7Gbps. WiGig will support wireless versions of various wired data transmission protocols, including DisplayPort, HDMI, PCI-E, and USB. WiGig makes use of PALs (protocol adaptation layers) to deliver the data using multiple protocols. For example, one PAL provides support for PCI-E and USB, while another PAL supports HDMI and DisplayPort protocols.

"We don't want the 60GHz bandwidth for one cable replacement," says Mark Grodzinsky, board member and marketing work group chair of the WiGig Alliance (www.wirelessgigabitalliance.org). "They all need to talk to each other."

With WiGig supporting such a wide variety of protocols, it will work with a variety of devices, including from consumer electronics, set-top boxes, computers, and HDTVs.

Giga-IR. Giga-IR builds on the successes of past infrared, optical wave data transmission technologies, differing greatly from the RF data transmission technologies listed above. Giga-IR requires line of

Heavyweight Support

The IrDA and WiGig Alliance both have several big-name companies and organizations involved in developing their specifications, which should help them have a much better chance of widespread adoption.

The companies on the WiGig Alliance's board of directors include the following: Atheros, Broadcom, Dell, Intel, LG, Marvell, Mediatek, Microsoft, NEC, Nokia, Nvidia, Panasonic, Samsung, Toshiba, and Wilocity.

"We're continuing to bring people on as we move forward," WiGig's marketing work group chair Mark Grodzinsky says. "It's the 'who's who' of the Wi-Fi industry. The PC market is pretty well covered as well as a number of the Asian PC makers, cell phone manufacturers, and handhelds. Some of the newer members we've brought on recently are in the graphics market."

The Giga-IR SIG (special interest group), formed in December 2007, consisted of these primary contributors: Computer Engineering & Consulting, E-Globaledge, KDDI, Panasonic, Rohm Semiconductor, and Waseda University. Most of these organizations are more well known in Japan and Asia than in the United States.

KDDI, a major manufacturer in Japan, was the primary company behind developing Giga-IR. IrDA's Executive Director of Marketing and Business Development Midori Miller says Panasonic has been a leading company, as well, in part because it makes both components and devices. Panasonic is the only company that's a primary member of both WiGig and the IrDA.

"We have device manufacturers, component manufacturers, and software manufacturers involved," Miller says. "We're fortunate that we've had a whole team." ▲

Sources: IrDA and WiGig Alliance

Giga-IR Timeline

The IrDA is one of the world's oldest wireless organizations, forming initially in 1990. Work on Giga-IR began a few years ago.

December 2007. The contributing companies listed here—led by KDDI, a leading Japanese telecommunications business—formed a special interest group for Giga-IR.

March 2008. The Giga-IR SIG agreed on the basic principles of the technology.

October 2008. The Giga-IR SIG had a draft of the protocol completed.

April 2009. The official specification for Giga-IR was completed. ▲

WiGig Timeline

May 7, 2009. Seventeen companies joined to form the WiGig Alliance.

Now, 15 companies are on the alliance's board of directors, while the following 11 are called contributors: Agilent Technologies, AMD, Beam Networks, NXP, Ralink, Realtek, SK Telecom, STMicroelectronics, Tensorcom, Texas Instruments, and TMC.

"Discussions started because 60GHz was on everybody's roadmap," Grodzinsky says. "This was something that all of these companies were considering anyway. . . . Once the real technological work started, it was not that difficult to get everyone together."

December 2009. The WiGig Alliance completed its version 1.0 specification, which supports backward compatibility with the IEEE 802.11 standard and can support data transmission rates between 1Gbps and 7Gbps.

"The member review is going on now, and we're just about done with that," Grodzinsky says. "We're still dotting a few i's and crossing a few t's."

May 2010. The WiGig Alliance expects to submit its version 1.0 specification to the IEEE.

Despite the large number of companies involved in WiGig's development, WiGig Secretary Jason Trachewsky says the process has been smooth.

"We're putting all of the competitors in the same room and then saying, 'Let's go compete,'" Trachewsky says.

Products featuring the WiGig specification could begin appearing at any time. Member companies don't have to wait for the IEEE submission to begin building products.

"The spec is done, which means people can be building to it," Grodzinsky says. "Nothing prevents people from building silicon now. . . . This isn't just a spec organization. We want to build products." ▲

sight between the two devices to transmit the data, but other wireless devices can't tap into the narrow band of infrared light, either inadvertently or on purpose.

"Our mission is, 'How fast can you transmit the data in a small device?'" says Midori Miller, the executive director of marketing and business development for the IrDA. "[Wireless technology] is really confusing for the consumer, but they don't have to know the terminology. Our mission right now is giving them a safe, easy, and quick way to transfer their data."

WiGig & Wi-Fi

Several highly successful companies support many of these wireless technologies, which offer several benefits, but WiGig has an ace up its sleeve: It will be backward-compatible with the highly popular and widely used Wi-Fi wireless protocol.

"One of the things we'd like to do is build on the success of what we've already done in wireless," says Jason Trachewsky, board member and secretary of the WiGig Alliance. "And there's nothing more successful in indoor wireless than Wi-Fi."

Devices that use Wi-Fi now will be able to use tri-band routers that work with WiGig, as the tri-band routers will support the 2.4GHz, 5GHz, and 60GHz wireless bands.

"[WiGig] will most likely appear initially as tri-band products, with 60GHz, 2.4GHz, and 5GHz," Grodzinsky says. "When you're within range of a 60GHz device, you'll operate at the highest speed. When you move out of range, you'll drop to a lower speed. If you're not in the 60GHz range anymore, you still have the transfer going on, it just scales down to [802.11n]. You'll have whole-house coverage.

"[WiGig] will do the same usage models you're able to do today, just much faster."

Dual-band Wi-Fi routers are already available, offering support for both 2.4GHz and 5GHz data transmissions. Devices made for 5GHz 802.11n will work with the 5GHz band, while older 802.11b/g devices can make use of the 2.4GHz band.

"In the future, 60GHz, 5GHz, and 2.4GHz all can work together," Trachewsky says. "We want to seamlessly move from one to another."

In addition, by making WiGig backward-compatible with Wi-Fi, manufacturers may be able to reuse some of the circuitry in WiGig products that they used in Wi-Fi products, making design easier and less expensive.

"Look at the companies," says Grodzinsky, who also is the vice president of marketing at Wilocity (www.wilocity.com). "These are the guys who built the Wi-Fi market from scratch. We can't make what's already out there obsolete. The new products wouldn't sell."

Going 60

The 60GHz wireless band is desirable because very few devices and technologies currently use the 60GHz band. Regulation of the 60GHz band is minimal, and it allows very fast data transfer rates, compared to existing wireless options that operate in lower 2.4GHz and 5GHz wireless bands.

"If you look at the regulatory environment for indoor wireless, really, your next step is 60GHz," says Trachewsky, who also is a senior technical director at Broadcom.

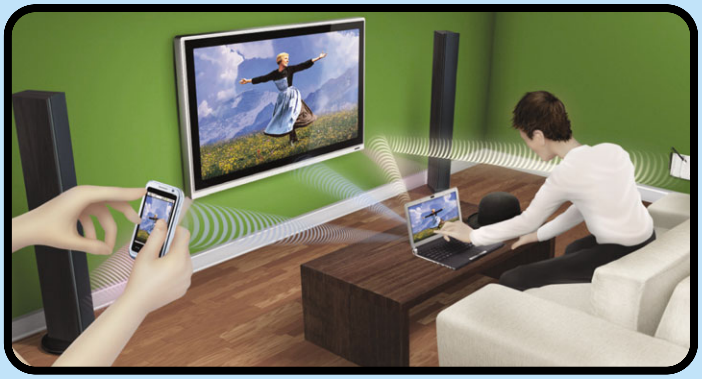
The trade-off for operating in the 60GHz band is that signals tend to degrade relatively quickly, again, at least compared to lower wireless bands. Oxygen molecules in the air tend to absorb the 60GHz signals, limiting their range to about 30 feet. The range of the WiGig signal will be closer to 15 feet before signals degrade noticeably.

WiGig can't work through walls, meaning it essentially is a one- or two-room technology. However, this isn't necessarily a bad thing, as the possibility of the signal leaking into the home of neighbors or even outside your home is very small. Other RF signals shouldn't interfere with your signal in the 60GHz band, either. The concept of beamforming (as shown in "WiGig's Use Of Beamforming") allows WiGig to extend the reach of its signal throughout a room and potentially into an adjoining room.

WiGig's Use Of Beamforming

To extend the distance its signal can travel, the WiGig specification will make use of beamforming, as does WirelessHD. In beamforming, signals will bounce off walls, ceilings, and the floor, helping the signal to travel farther.

Beamforming can increase the sensitivity of the receiver in the direction from which the signal is originating. In a similar manner, beamforming allows the transmitter to generate more power in the direction it's trying to send the signal. As a trade-off, power and sensitivity in other directions are reduced.



As shown here, the signal from the antenna mounted to the wall "bounces" to the laptop, because the line of sight between the two devices is broken by the person leaning forward. With direct line of sight between the laptop and TV and between the laptop and cell phone, no beamforming is required.

"Even if you have a device on the other side of a wall, we can bounce the signal off things," WiGig Secretary Jason Trachewsky says. "60GHz still has some big advantages." ▲

Sources: WiGig Alliance, WirelessHD.org

Illustration: Courtesy WiGig Alliance

One of the reasons 60GHz wireless technologies are finally ready to move into the marketplace is the advent of relatively inexpensive chips. In recent years, 60GHz chips were costly, manufactured from gallium arsenide. More recently, though 60GHz chips are being manufactured from less expensive silicon. These CMOS chips also require less power to operate than the previous types of gallium arsenide chips.

The 60GHz technologies also don't require very much power to operate, making them work well with handheld devices that use battery power.

"One of the things we've done with the specification is to focus on the devices that are transmitting the data," Trachewsky says, referring to battery-powered devices. "We need a wireless interface that can move data quickly at low power, and 60GHz can be low power."

Giga-IR Aims At Handhelds

While WiGig is hoping to work with a variety of devices immediately, Giga-IR is aiming at the portable and handheld mobile markets at first.

"In our first phase, we're definitely looking at portable devices," Miller says. He adds that portable devices currently have an average life span of 12 to 18 months.

"Within that cycle development, you need to have a cost-effective and power-efficient device," Miller says.

As handheld devices have become more versatile, adding numerous multimedia capabilities, they're storing more and more data. Miller says they need advanced capabilities for moving that data wirelessly. The speed of Giga-IR helps them move the data at the required speeds, she says.

"One single [handheld] device is doing so many jobs," Miller says. "Storage capacities are drastically changing in demands for storage. The challenge has always been moving the data."

Making The Giga-IR Connection

Miller says Giga-IR includes some of the successful features found in the IrDA's IrSimple technology. With IrSimple, the time required for infrared devices to set up the rules of the data exchange—the "handshake"—has dropped significantly.

"With IrSimple, it's much faster and simpler," Miller says. "The negotiation time [and] the speed went drastically faster. That really helped people to re-evaluate IR."

Miller says the IrDA is not trying to replace Wi-Fi with Giga-IR. However, she does think Giga-IR has some room to grow outside Asia, where IR data transfer technologies are more popular than elsewhere in the world.

"IrSimple is very successful in Japan and Asia," Miller says. "Hopefully, we'll have similar results coming back to the U.S. and Europe. It will be interesting to see how the IR concept will be received."

A Future Without Wires

The coming months should be interesting, as Wi-Fi has a large advantage over other wireless networking technologies in the United States. With the added speed of WiGig and the backward compatibility with Wi-Fi, it will be tough for another standard to move into the U.S. wireless networking space. Regardless of which standard you end up using—if not both—the improved wireless speeds should open up quite a few new uses for handhelds and computers. ▲

by Kyle Schurman

Giga-IR Explained

To create the infrared signal, the Giga-IR hardware converts the original electrical pulse into an infrared light pulse, either with LEDs or laser diodes.

Because laser diodes can more closely mimic the wavelength pulse of the original data, they can work at higher speeds.

IrDA Executive Director of Marketing and Business Development Midori Miller says 1Gbps is probably the maximum speed that LEDs will be able to achieve. Greater speeds will require photo diode lasers, which are a little more expensive. But both types of devices will work under the Giga-IR specification.

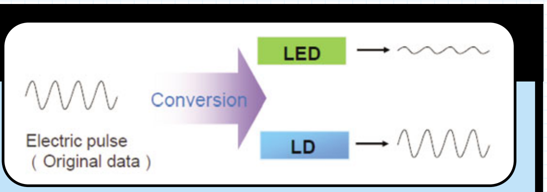
"The module is smart enough that it can use both," Miller says. "That's a nice feature that we have."

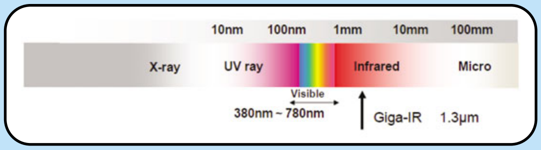
"If we go to 3Gbps next year, we'll probably have to focus on lasers," Miller says. "That's a big transition for us if we're not going to use any more LEDs."

LEDs are less expensive than photo diode lasers. Miller says it will be interesting to see what consumers will want in their Giga-IR devices. If they want more speed, they'll have to buy IR devices with photo diode lasers, which may cost 20 to 30% more than LEDs, according to Miller.

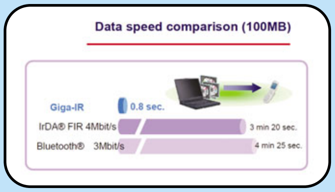
"[1Gbps] devices are pretty fast," Miller says. "If you're happy with that speed, stay with LEDs. But, with video [downloads], you may have to go with photo diode." ▲

Source: IrDA





Giga-IR works outside the visible spectrum, at a wavelength of 1.3 micrometers (1,300 nanometers). Miller says infrared lasers in this area of the infrared spectrum should be safe for human eyes.



Giga-IR offers far more transfer speed than has been available with either FIR (fast infrared) or Bluetooth, which Miller calls a "sister specification" to IR, as both use some of the same core layer protocols.

ZALMAN

ZALMAN Z7 PLUS CASE

Zalman's Z7 Plus case is designed to meet the needs of all of your aesthetic, cooling, and building objectives. The ATX case is sturdily constructed of steel and plastic, and rests on four rubber-mounted feet that absorb vibrations and reduce noise. A recessed compartment at the front of the top panel features convenient peripheral connections, including 2 USB, 1 eSATA, and audio I/O ports.

Get The Look

The Z7 Plus sports a sleek, black exterior, complemented by textured black mesh on the front and left side panel. The case is elegantly accented with blue LEDs, found on both the 120mm front panel fan and the Zalman logo at the forefront of the case.

Keep It Cool

The Z7 Plus puts a lot of emphasis on efficient cooling. For starters, each of the mesh covers on the front panel features a dust filter, ensuring that your components are free of excess dust and debris. Three 120mm fans located in the front, rear, and side panels move air through the case; the side fan sports a two-channel fan controller to better manage cooling and noise levels, while the front fan doubles as a hard drive cooler because it attaches directly to the removable 5-slot HDD bay.

There's also an extremely handy CPU cooler back plate opening in the motherboard tray to make installing CPU coolers a snap, as well as a pair of rubber tube holes on the back panel to accommodate liquid-cooling setups.

Build With Ease

In addition to a sophisticated exterior, the Z7's interior measures 300mm from front to back, not only making it easier to install your components, but also offering enough room for even the longest graphics cards.

The Z7 Plus sports four 5.25-inch external ODD bays, which are all tool-free for easy installation and maintenance. Likewise, hardware can be added and removed from the seven expansion slots with a one-touch lock. ▲

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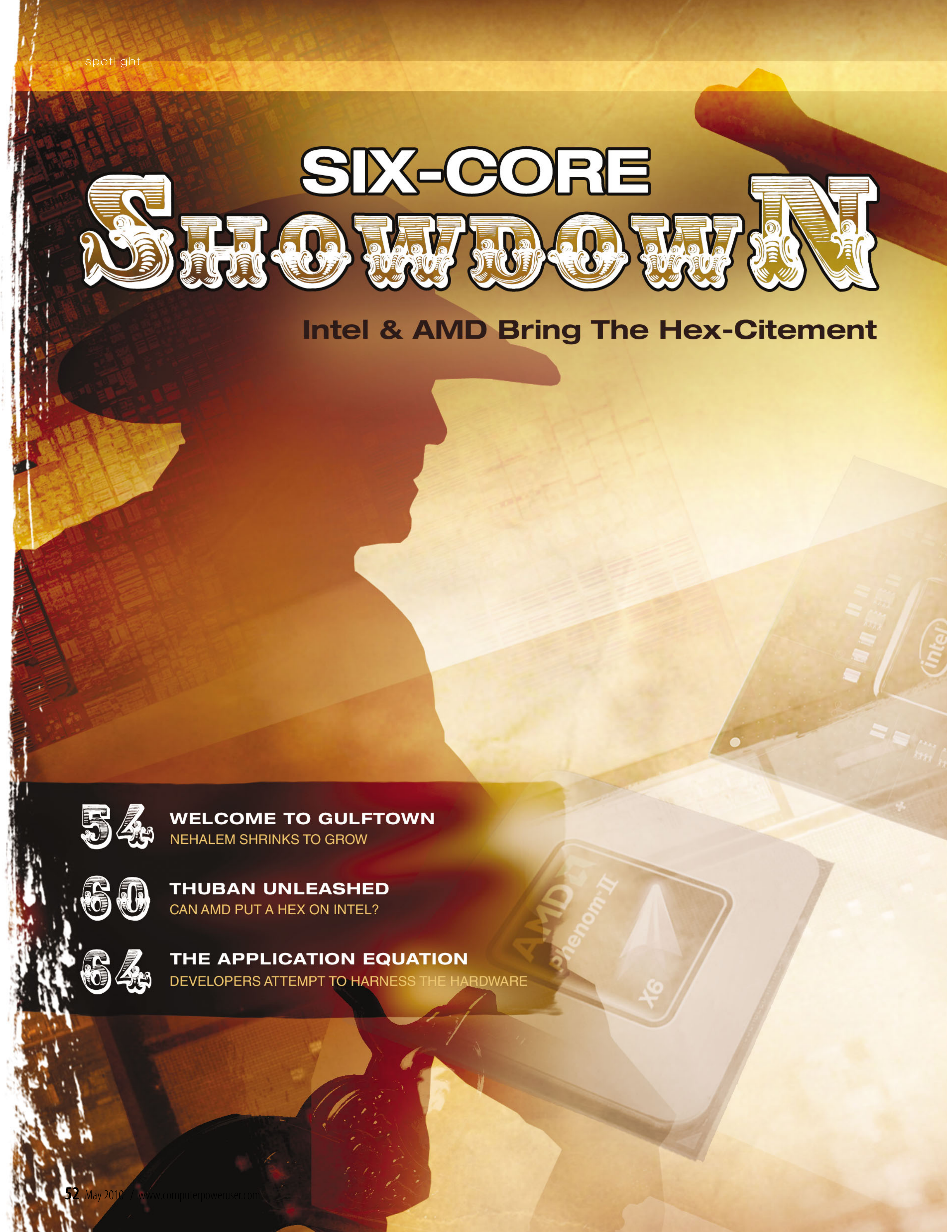


SIX-CORE SHOWDOWN

Intel & AMD Bring The Hex-Citement

54 WELCOME TO GULFTOWN
NEHALEM SHRINKS TO GROW

60 THUBAN UNLEASHED
CAN AMD PUT A HEX ON INTEL?

64 THE APPLICATION EQUATION
DEVELOPERS ATTEMPT TO HARNESS THE HARDWARE

Years from now, when you're hauling your grandchildren to soccer practice in a Tesla minivan and finally turning in your Harley for a 34th-generation Martin Aircraft Jetpack (see this month's "Dream Hardware" on page 15) as your preferred one-passenger mode of transportation, you'll be lamenting the day that new-fangled photon processor replaced your silicon-based 80-core Intel Core Zeta 9000 dinosaur. And when your grandchildren, proud *CPU* (celebrating its 53rd year!) readers themselves, ask you to share more about the simpler days of computing, you'll have this very issue to turn to for help. At your age, you might need it, Gramps.

You see, 2010 is a fairly significant pushpin on the ol' computing timeline. This year, both Intel and AMD have stepped up to the plate with new silicon sluggers boasting 50% more cores than previous efforts. (At press time, Intel's Core i7-980X, formerly code-named "Gulftown," has already stepped up to the plate, while AMD's Phenom II X6, code-named Thuban, was still taking a few final cuts in batting practice.) And although it seems like only yesterday that four discrete cores were the most you could pack onto a single desktop processor die, the chip industry has actually been moving along at a nearly metronomic pace, with hexa-core CPUs showing up right on schedule (relative to the time elapsed between two- and four-core processors).

And the best part is that there's more to the story than simply stuffing more cores on the same die. For Intel's part, the Core i7-980X gives you much more for much less. Specifically, those extra cores and extra cache (Gulftown's Smart Cache weighs in at 12MB, which is 4MB more than the previous flagship Core i7-975X's 8MB) don't translate to a need for extra power: The 980X boasts exactly the same TDP (130W) as the 975X. Hyper-Threading, Turbo Boost, Nehalem's integrated memory controller—they're all back for an encore. Find out more about Gulftown on page 54.

A few miles west on CA-82 finds Sunnyvale telling a similar six-core narrative as Santa Clara. Based on what we currently know about Thuban, here's the scoop: Thuban will roll out officially as the Phenom II X6—six cores on a 45nm process. CPU drag racers living their lives a quarter-cup of liquid nitrogen at a time will be pleased to hear that the Phenom II X6 will be available as a Black Edition SKU with an unlocked multiplier; get on the horn with your preferred LN2 provider and place your order now. And, not to be outdone by its archrival, the Phenom II X6 will sport Turbo CORE, which is similar in both name and principle to Intel's Turbo Boost. As you might expect, there's a slight variation in execution, however. AMD's 890GX chipset is already available, but AMD should be letting the 890FX into the wild at the same time as it uncages Thuban. The 890FX brings twice the thunder in terms of PCI-E bandwidth available for your graphics cards, but both the 890FX and 890GX will be linked to AMD's SB850 southbridge and all its 6Gbps SATA goodness. Turn to page 60 for the nitty-gritty.

What lies down the road(map)? Well, that's something only Intel, AMD, Wikipedia, and Mike Magee know, but Intel's next desktop offering (code-named "Sandy Bridge") will be a shiny new microarchitecture using the same 32nm process as Gulftown. Look for it to drop at the end of 2010. In AMD's future, its Bulldozer microarchitecture will drop in 2011, with an eight-core desktop monster bearing its teeth; AMD has code-named the processor "Zambezi."

Although it's terrific that Intel and AMD keep on trucking, what can you actually do with all those cores? On the software side, making the move to multithreaded presents just as many, if not more, challenges. Optimizing software to put every CPU core under load is harder than you might think. In some cases, programmers are faced with the task of having to tear down years of code and start from scratch. On page 64, we picked the brains of two Gearbox Software (the folks who brought you Borderlands) platform specialists about the challenges software developers must overcome to effectively harness all of that unbridled processing power.

So regardless of the flag you wave, both AMD and Intel will have six-core champions ready for you. It's going to be another exciting year. ▲

by Vince Cogley

WELCOME TO GULFTOWN

Nehalem Shrinks To Grow

If you scrimped and saved enough money to go buy the Ferrari or Porsche of your choice and finally had the cash, would you still get the car? Setting ego aside, the answer might depend on where you live. If your days are spent going 35 on the commute and 25 in your neighborhood, having a supreme sports car might be . . . excessive. On the other hand, if you live in Europe with easy access to the Autobahn, then being allowed to blast along at 130mph or better might well justify all that muscle.

We now have a similar situation with Intel's new Core i7-980X, the first, and so far only, member of a processor group code-named Gulftown. The 980X is the first six-core CPU on the consumer market and probably the fastest processor on the planet. The question is whether the chip is worth its $999 asking price. The answer will depend on how you drive—meaning your everyday apps. Some will find dropping a grand on Intel's fresh flagship a fair bargain. Others may scratch their heads and wonder why they didn't save $400 and go with the quad-core i7-960.

To better know which Intel processor you should be driving, let's lift the hood on Gulftown and see what makes her roar.

Gulftown Background

No doubt, you remember what a splash Intel's Nehalem architecture made last year. It marked the end of making one monolithic die for an entire CPU generation and then simply disabling features in order to distinguish models. Instead, Intel moved to a modular design wherein the company can change the number of cores, memory channels, and intercomponent connections (QPI or DMI links). Intel can also pick whether the memory and graphics controller are built in or down on the chipset, what type of memory is used, which power management features are implemented, and so forth. The shared elements on the processor die, such as L3 cache (new on Nehalem), memory

controller, QPI/DMI links, memory controller, and power and clock, are collectively known as the "uncore."

Other Nehalem features included the rebirth of Hyper-Threading and a new technology called Turbo Boost. Briefly, Hyper-Threading allows each CPU core to use idle circuitry blocks to simulate a second "virtual" or "logical" core able to execute another instruction thread. In a sense, you get two cores for the price of one; while a logical core doesn't deliver the same horsepower as a conventional physical core, it still gives a significant performance boost for relatively little additional energy consumption.

Turbo Boost technology recognizes when only lightly threaded workloads are present. The CPU shuts down unneeded cores and gives some of their power and thermal overhead to the remaining cores, automatically overclocking it (or them) in 133MHz steps until either the chip's inherent limit or a power/thermal limit is reached. Turbo Boost was only one way in which Intel worked to increase total efficiency and output more work for less total energy.

Another power-saving method that received nowhere near the credit it deserved was using power gating to stem current leaking, an increasingly thorny problem as process sizes continue to shrink. Before power gating, CPU cores would leak power while in deep sleep states, just as many appliances continue to leech power while turned off. Intel implemented a PCU (power control unit) to manage current flow in the cores and totally sever flow to idled units.

This is important because it's necessary to understand the kinds of foundation-level steps Intel has taken to keep increasing core counts and complexities without commensurate increases in TDP profiles. Amazingly, the 3.33GHz Core i7-980X, with all of the features we're about to cover, is only a 130W TDP part. Compare this to the 3.2GHz Core 2 Extreme QX9775 of two years ago, which, with two fewer cores, less total cache, and almost 300 million fewer transistors, tipped the scales at 150W TDP.

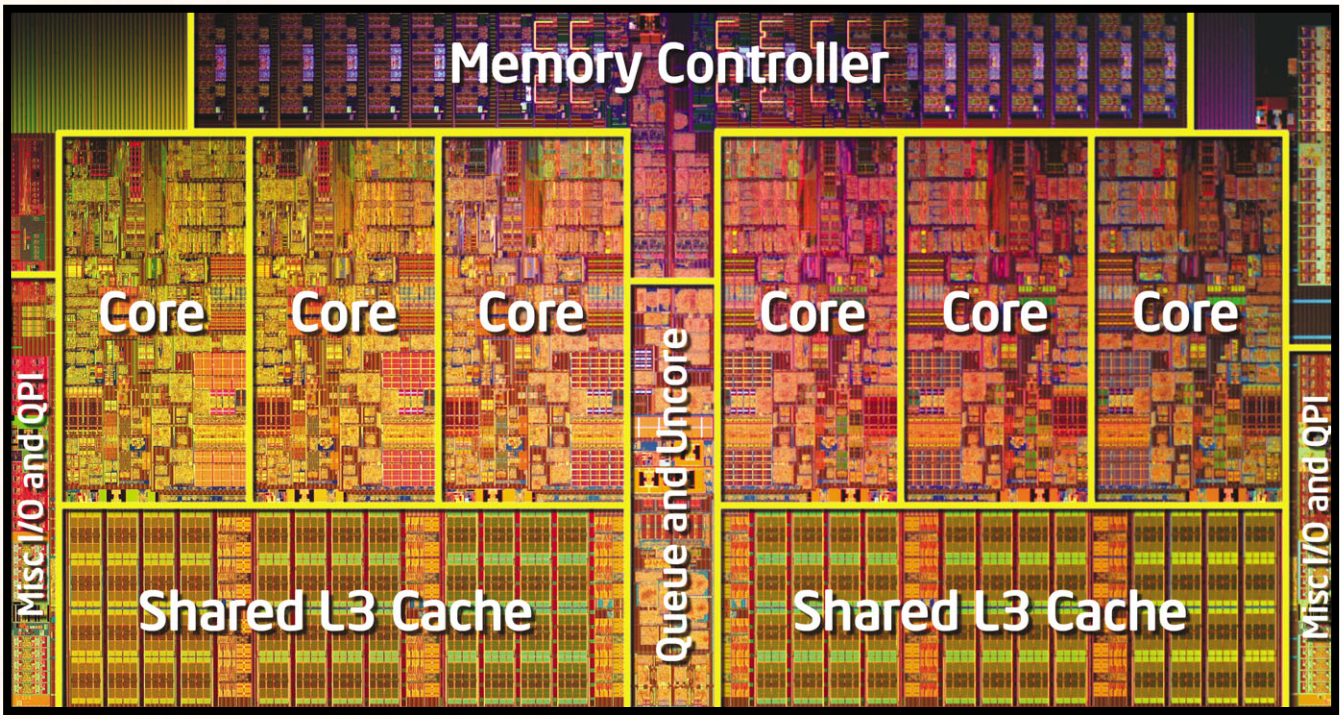
One of the brightest points in the Gulftown story is that it requires no new platform investment. If you were one of those left slapping your forehead at the revelation that Socket LGA-1156, P55-based motherboards were just about as fast as their more expensive LGA-1366, X58-based counterparts, this is your day of justification. To the best of our knowledge, all X58 motherboards, including Intel's DX58SO ("Smackover"), are flash-upgradeable to Gulftown support.

Go Westmere

Intel's "tick tock" development strategy dictates creating a new process technology (45nm, 32nm, etc.) on the "tick,"

DX58SO
intel
EXTREME
BOARD inside
DX58SO
Extreme Series
ULTIMATE GAMING STARTS WITH INTEL INSIDE
FOR THE INTEL CORE i7 PROCESSOR FAMILY IN THE LGA1366 PACKAGE

A little flash can go a long way. Intel's DX58SO was part of Nehalem's launch platform, and it remains Intel's go-to board for Gulftown's arrival, provided, as with any X58 board, you download the latest BIOS update.



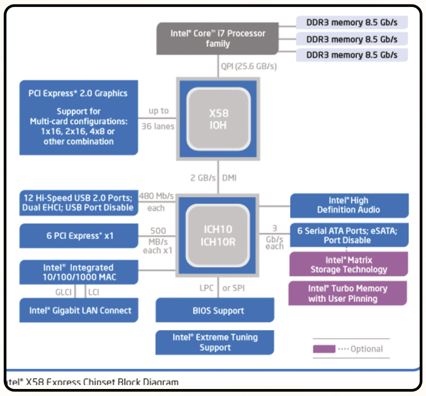
In this marked up Gulftown die shot, you can see that the six physical cores consume almost half of the total die. Uncore elements look rather small running down the center, and the DDR3 memory controller takes up almost half as much real estate as the shared L3 cache.

then devising a new microarchitecture on the "tock." Nehalem was the "tock," built on a 45nm process. Westmere is the 32nm "tick" that shrinks the Nehalem microarchitecture.

Naturally, the 32nm shrink was the key advance that made Gulftown possible. Smaller transistors consume less energy and can be packed more densely. Without that roughly 25% drop in transistor size, Intel couldn't have fit two more cores and another 4.5MB of total cache into the same approximate die form factor. (Exactly how AMD managed to add two cores while staying at the 45nm node remains to be seen.) All told, the Core i7-980X die contains 1.17 billion transistors and occupies 248mm^2.

As mentioned above, one of Nehalem's great advances was applying power gating to the cores. With Westmere, Intel extended power gating to the uncore area of the processor, spreading energy savings more thoroughly throughout the chip. Of course, other power-saving elements from preceding generations, such as the use of High-k dielectric to reduce current leakage, apply here, as well.

Being paired with the same X58 chipset, it's not surprising that Gulftown uses the same memory controller as its quad-core Bloomfield forebear. The Core i7-980X is rated for three channels of DDR3-1066 system memory. You might recall that Core i7-8xx series chips based on LGA-1156 use dual-channel DDR3-1333 memory. Interestingly, the server market rebranding of the i7-980X, called the Xeon X5680, specifies triple-channel DDR3-1333.


Intel® Core™ i7 Processor family
DDR3 memory 8.5 Gb/s
DDR3 memory 8.5 Gb/s
DDR3 memory 8.5 Gb/s
QPI (25.6 GB/s)
PCI Express* 2.0 Graphics
Support for Multi-card configurations: 1x16, 2x16, 4x8 or other combination
up to 36 lanes
X58 IOH
2 GB/s DMI
12 Hi-Speed USB 2.0 Ports; Dual EHCI; USB Port Disable
480 Mb/s each
6 PCI Express* x1
500 MB/s each x1
Intel® Integrated 10/100/1000 MAC
GLCI
LCI
Intel® Gigabit LAN Connect
ICH10 ICH10R
Intel® High Definition Audio
3 Gb/s each
6 Serial ATA Ports; eSATA; Port Disable
Intel® Matrix Storage Technology
Intel® Turbo Memory with User Pinning
LPC or SPI
BIOS Support
Intel® Extreme Tuning Support
Optional
tel® X58 Express Chipset Block Diagram

Seen from the platform level, Gulftown and Bloomfield look practically identical. The X58/ICH10 chipset remains unchanged, including in its storage and USB details. Perhaps Intel will provide an LGA-1366 alternative platform with updated specs, but we're not holding our breath.

Another feature new to Westmere is Intel's set of 12 instructions for AES, called AES-NI (Advanced Encryption Standard New Instructions). These are akin to SSE instructions in that they dedicate resources specifically to accelerating certain tasks, in this case the encryption and decryption of AES algorithms. On paper, AES-NI can yield incredible results, such as a 9x performance increase in synthetic benchmarks. It remains to be seen how practical AES-NI is in daily, real-world applications. We hope that software vendors continue to integrate AES into their products to help increase general security, especially with AES-NI all but erasing the system resource impact typical of most software-based encryption apps.

There's not much to add about Gulftown's Hyper-Threading implementation. The operating system registers Gulftown as 12 distinct cores (which is a real sight to behold in Windows Task Manager). With Turbo Boost, the Core i7-980X is able to realize two bins of improvement on a single core, from 3.33GHz up to 3.6GHz. With all six cores active, Turbo Boost can deliver one extra bin.

Core i7-980X In Real Life

Performance fans might look at two performance bins—a relatively slim 266MHz—as a rather stingy improvement, especially when we compare that to the similarly named Core i7-920XM Extreme Edition Mobile. This quad-core, 45nm part specs at 2GHz, but Turbo Boost will lift it clear to 3.2GHz without breaking the chip's 55W TDP envelope. What gives?

"The constraining factor on that 3.33GHz core frequency is very high," explains Intel's Ronak Singhal, senior principal engineer, "meaning that if I'm only running on a single core, I can put those other cores to sleep. But with power gate technology, I have the ability to run closer to what the silicon's limit is. For 130W parts like Gulftown, my constraint on power is much lower. Even with all cores running, I'm much closer to the silicon limit, which is why you only see two bins of upside."

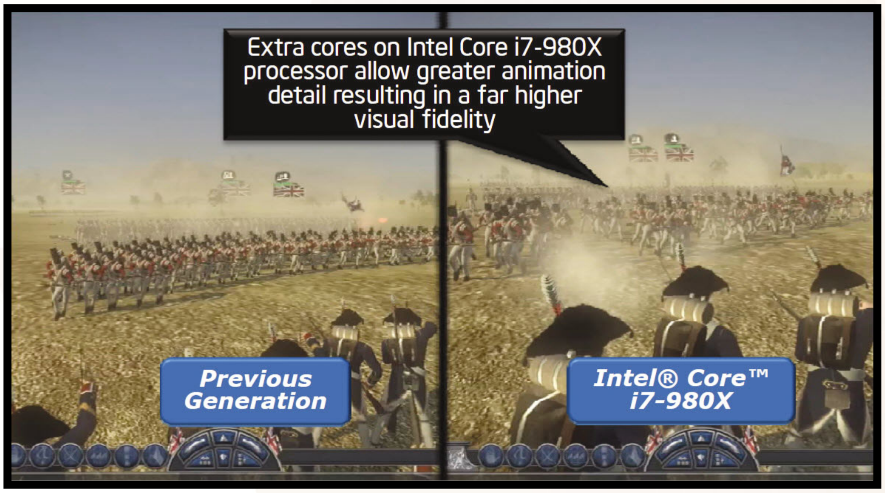
Making statements about the Core i7-980X and gaming becomes difficult. When you look at Intel's showcased benchmarks, the Gulftown advantage over Bloomfield looks obvious. The trouble is that many of those resolutions are at unrealistically low levels meant to push the processing load onto the CPU. At resolutions of 1,600 x 1,200 and above, processing typically shifts to the GPU. This is why you'll see review after review comparing 3.33GHz Gulftown and Bloomfield CPUs and showing statistically identical results.

Now, if a game is coded to make use of those extra CPU threads, then you bet you could see a big jump in areas such as physics and AI. The gaming examples that Intel shows in its press materials had yet to be released as of this writing. If you're looking at buying Gulftown to accelerate games you already own, do your homework. The performance you actually get may not be what you expect. A game that is coded to only use two or four threads will

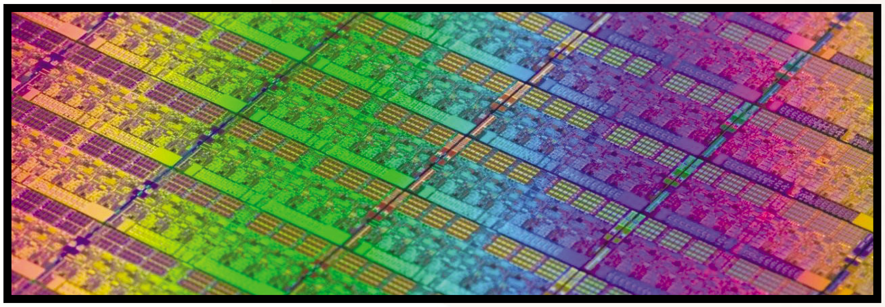
Code Name Cheat Sheet

Feeling lost in the rat's nest of Intel's naming schemes? We're here to help. If you can't decide if it's easier to use the official CPU names or their code-name counterparts, here's a quick reference list showing both. ▲

Code Name	Description
Gulftown	Core i7-9xx(X) / Xeon 36xx / Xeon 56xx (LGA-1366, 6 cores/12 threads, 12MB L3, 130W, QPI)
Westmere	32nm process node based on Nehalem microarchitecture
Sandy Bridge	Next-gen microarchitecture based on 32nm process
Nehalem	Microarchitecture based on uncore, power gating, Hyper-Threading, Turbo Boost
Bloomfield	45nm Core i7-9xx based on LGA-1366, 130W, QPI
Clarkdale	32nm Core i5-6xx, i3-5xx, and Pentium G6950 based on LGA-1156, dual-core, DMI, 73W or 87W; contains 45nm graphics unit
Lynnfield	45nm Core i7-8xx and Core i5-7xx based on four cores, DMI, 82W or 95W


Extra cores on Intel Core i7-980X processor allow greater animation detail resulting in a far higher visual fidelity
Previous Generation
Intel® Core™ i7-980X

Intel's marching orders to software developers have recently concentrated on finding ways to make better use of more threads. In this example from Napoleon: Total War, you can see how additional threads have been used to improve AI and give more objects a wider range of animation options.



There may not be a pot of gold at the end of this rainbow, but the pile of cash needed to buy all of the 32nm, six-core processors on this wafer sure comes close. Much of Intel's 32nm production is currently done at the company's facilities in Hillsboro, Ore.

Intel Q&A

Working from official literature will only get you so far. We went to two key Gulftown insiders, product marketing engineer Karl Shurts and senior principal engineer Ronak Singhal, in search of some off-the-cuff insights.

Q **What were some of the key design challenges Intel faced in transitioning to six cores?**

RS When you scale things to a new manufacturing process, structures scale differently, right? Piecing everything back together so you don't break some of your key circuits and how things are placed next to each other is hard. I'm not a designer myself, but when I talk with our designers, they talk about how in the good old days, it was so much easier to remember all the process design rules—how close a transistor can be to this or that feature or how structures are positioned. Now the rules are very, very complex. Nobody can memorize them all.

KS One of the big advantages we had on Gulftown, though, is that it was the exact same design team that did Nehalem. Often, there are separate teams that do these projects. By having the same team, you don't have to retrain people on what the key problems are, the key algorithms, how things work together.

Q **Given that AMD's six-core processors are about to arrive at around $300, do you feel $1,000 for the i7-980X is justified?**

KS We don't expect [Thuban] to actually be very competitive, even compared to our four-core part on this platform. We think that not all cores are created equal, as you know. It remains to be seen until we get silicon from them and run our own tests, but we believe our Nehalem will remain very competitive with four cores, even relative to their six.

Q **Some coming games are showing massive multithreading improvements, like 10x or 15x leaps in the number of on-screen elements. How is this possible from a 50% increase in compute resources?**

RS ISVs tend not to be able to optimize with every generation of CPU, because they come out pretty fast. When was the last time they did a round of optimization? Now they see that there's been enough change for them to make an investment. It's not necessarily a case of switching from four to six cores.

Q **What else are Intel and its engineers focusing on beyond six cores?**

RS With each process technology, I get a bigger budget to spend. It's a question of how I want to spend it. I could simply just take the existing core and lay down more of them. Our belief is that's not sufficient, because the benefit you get by increasing the performance within a core is very important. Some apps will be able to take advantage of as many cores as you can give them, but a lot of apps scale according to a limited number of cores being active at any point in time. So you'll continue to see us push the performance in each core generation after generation. With Nehalem, you saw a big boost with that. You can extrapolate that we're likely going to try and match what we've done. ▲

benefit from higher clock speeds but not higher thread counts.

In some ways, gaming as a whole is behind the curve on multithread adoption. Apps in areas such as 3D content creation, media transcoding, antivirus scanning, and photo/video editing have tended to embrace multithreading much more enthusiastically. Across these software types, we're seeing scaling in the move to six-core of anywhere from 5 to 50%. The fact that 3DMark Vantage (CPU score) and Cinebench 11.5 (3D rendering) can realize the almost perfect scaling of essentially 50% improvement in the move from four to six cores is amazing.

We've seen from Core i5-6xx and Core i3-5xx models released earlier this year, the 32nm node continues Intel's recent trend of providing plenty of frequency overhead. Reviewers continually find that the 3.33GHz i7-980X will clock to 4GHz on air cooling and 4.5GHz with water, so tweakers should continue to enjoy a large BIOS settings playground in which to romp around.

The good news with being tied to the X58 chipset is that there's no platform change needed to upgrade to Gulftown. The downside is that there are no other platform improvements. The ICH10 southbridge still only offers support for USB 2.0 and 3Gbps SATA at a time when the USB 3.0 and 6Gbps SATA are rolling out. The X58 delivers 32 lanes of PCI-E 2.0 connectivity, which is fine for dual 16-lane or quad 8-lane implementations.

What's Next

Looking past Gulftown, Intel's next "tick" will be Sandy Bridge. Although there is plenty of unofficial information floating through the sea of Internet rumors about the Sandy Bridge die already, Intel has officially acknowledged the next generation's AVX (Advanced Vector Extensions; software.intel.com/en-us/avx). In Nehalem-class systems, vector instructions are 128 bits in length. In single-precision math operations, one can work on four separate elements at a time because they're each 32 bits. With AVX, that vector width doubles. A single instruction can work on eight elements rather than four, thereby doubling the floating point compute capability of the cores. This will deliver a significant performance jump across a range of applications, but AVX also aims squarely at making a dent in the advantages gained with GPGPU computing technologies, such as AMD's Stream and Nvidia's CUDA.

Still, that's all to come. For now, Gulftown sets a new high-water mark in processor horsepower. If you want to rage down the application Autobahn at top speed, this is the way to go. In the server and workstation markets, there's little doubt that Gulftown will provide exceptional value. Whether that applies to consumers in general—and you specifically—will be determined by your daily usage. If your apps can push all 12 of those threads, Gulftown will deliver more performance than you've ever seen. ▲

by William Van Winkle

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THUBAN UNLEASHED

Can AMD Put A Hex On Intel?

Back in our November 2009 issue, we profiled AMD's limited edition, not-for-sale TWKR chip and detailed how the nominally 3.2GHz chip was able to scrape the 7GHz ceiling when overclocked on liquid helium. (See page 54.) Better yet, some enthusiasts in Finland were able to actually hit 7GHz on the TWKR's retail equivalent, the Phenom II X4 955 Black Edition.

AMD's commitment to power users remains obvious, so we're even 50% more excited about the arrival of the Phenom II X6, previously codenamed Thuban, at the end of April. With two more cores added to the Phenom II die, this bad boy should impress like mad. As AMD brand manager John Crank quipped to us, "It's so fast, you can see into the future with it!"

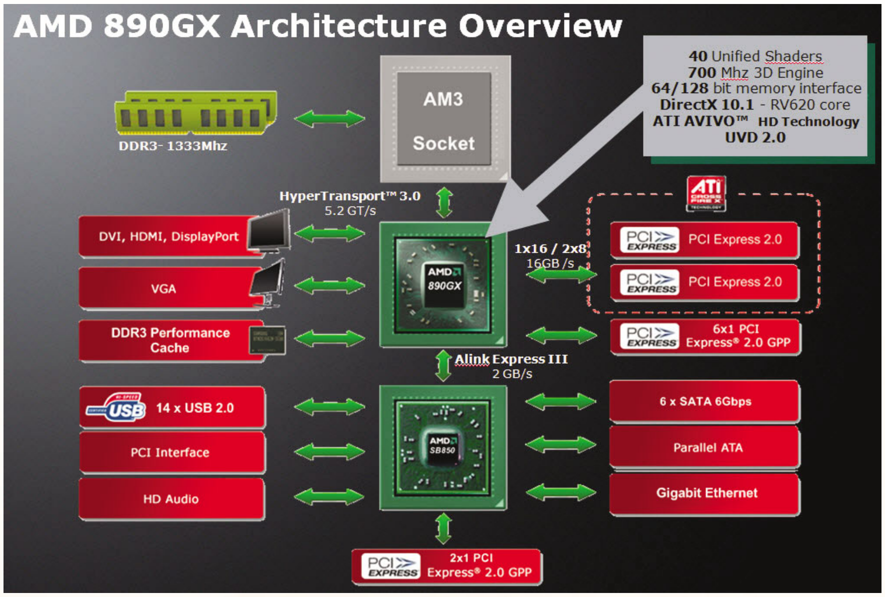
Past Meets Future

The good news is that the Phenom II X6 doesn't need a Flux Capacitor to pull off its feats of clairvoyant speed, nor does it consume 1.21 gigawatts. It does blend a lot of existing Phenom architecture with a few new interesting twists to yield a new flagship product that AMD hopes will not only deliver the best performance per dollar on the market but also keep its loyal enthusiast base satisfied and begging for more.

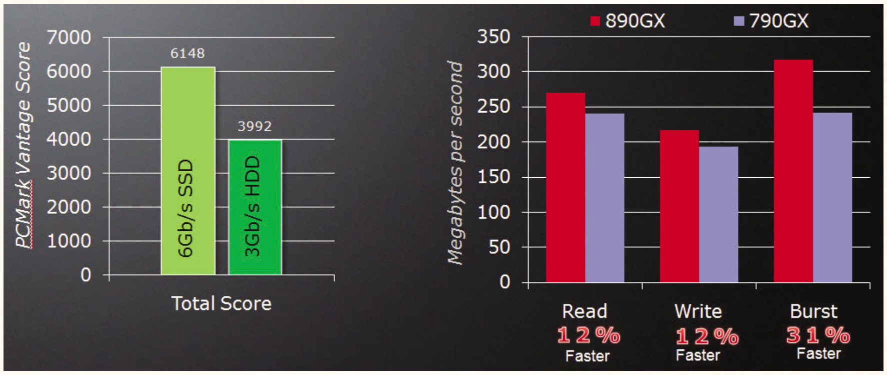
As with today's Phenom II X4 processors, the updated X6 uses AMD's AM3 socket architecture, so if you already have an AM3 motherboard, you're covered. Just flash the BIOS to support the new CPU. You should also have AM2+ support (including the split-plane power benefits), provided your motherboard vendor enables it.

Naturally, nothing has changed with regard to AMD's Direct Connect Architecture, 16GBps peak HyperTransport 3.0 links, integrated DDR2/DDR3 memory controller, AMD-V, Cool'n'Quiet, or any of the other Phenom II family mainstay specs. AMD didn't confirm the exact cache configuration of the X6 for us, but it will still use the triple-level design found in the X4. AMD *did* say that X6 will have more total cache than the X4, so it seems more than likely that we'll be looking at the same 6MB of shared L3 and 6x 512KB of dedicated L2 for a total of 9MB.

In times past, AMD would give peeks into expected clock speeds within a month of launch time. With the Phenom II X6, the company is playing its cards closer to the vest. All we could



A look at the Leo platform reveals several enticing features, including continued AM3 and DDR3 support, loads of PCI-E 2.0 lanes for multi-GPU graphics, and SATA 6Gbps ports for top-speed storage.



Faster storage capabilities from the 890 chipset can yield incremental performance gains. Expect this to increase as next-gen SATA drives arrive and evolve.

get from AMD by press time was that there would be, in the words of senior manager Simon Solotko, "more than one model at launch" and that "we will launch at speeds above 3GHz . . . and I don't mean 3.001GHz."

Another bit of news we got from AMD was John Clark telling us, "We're looking at CPUs over 3GHz with six real cores." Add to this the news we spotted just before press time of a Bahrainian retailer posting "official" confirmation of a 3.2GHz 1090T Black Edition (125W) that will sell for $295. If true, that's news worth jumping up and down for.

Nobody expects the Phenom II X6 to outperform Intel's Core i7-980X at equivalent clocks, and AMD sure isn't making any claims to that effect. But if we look back at direct comparisons between the Phenom II X4 965 and Core i7-975X, core for core and clock for clock, the 975X may take the performance crown, but AMD's 965 is nonetheless able to achieve a level of performance that makes it a virtually unbeatable price:performance play.

For years, AMD has liked to trumpet value-oriented messages such as this one, and it always has a bit of a tinny marketing ring if you're a performance purist. If AMD could outbenchmark Intel clock for clock, the song would sound different. But just because the refrain is old doesn't mean you still can't dance to it. It's true that Intel having at least three sockets just for today's desktop offerings puts a real crimp in potential upgrade paths. It's also true that socket longevity gives buyers the option to start cheap and stay cheap over the next year or two as formerly top-end processors fall toward the bottom of the stack.

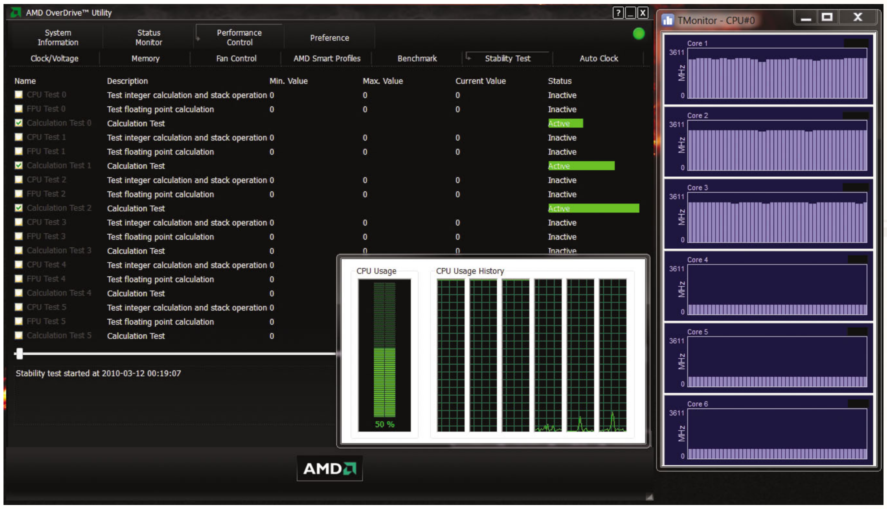
Similarly, there's no denying that if you want to buy a six-core chip next month, you'll save several hundred dollars by going the AMD route. That money could go toward an SSD, a higher-end graphics card, or any of several other methods of lifting total system performance.

"Gulftown is probably going to have four digits associated with [its price]," says Crank, "and there's not going to be a lot of tangible gaming performance gain associated with it. Compare that to an AMD Phenom II X6 platform. I think you're going to find you can buy an entire Phenom II X6 system, the whole PC, for just the price of a Gulftown chip alone."

Many buyers will wonder about power profiles. While staying on the 45nm process, AMD has taken on 50% more L2 cache and 50% more die surface, yet (without giving away specific numbers as of press time) the company maintains that the power consumption of the X6 models will be in "very similar power bands" to their X4 predecessors. If so, we can expect most models to fall into approximately 95W and 125W buckets, with top-end parts perhaps hitting 140W and special low-power variants drifting to 65W.

"Our products already go down to 45W in quad-core today," says AMD spokesperson Matt Davis, "so you can certainly expect us to release similar low-power variants of the X6." (Note that AMD's current 45W parts are Phenom IIs without L3 cache, branded as the Athlon II X4 600-series.)

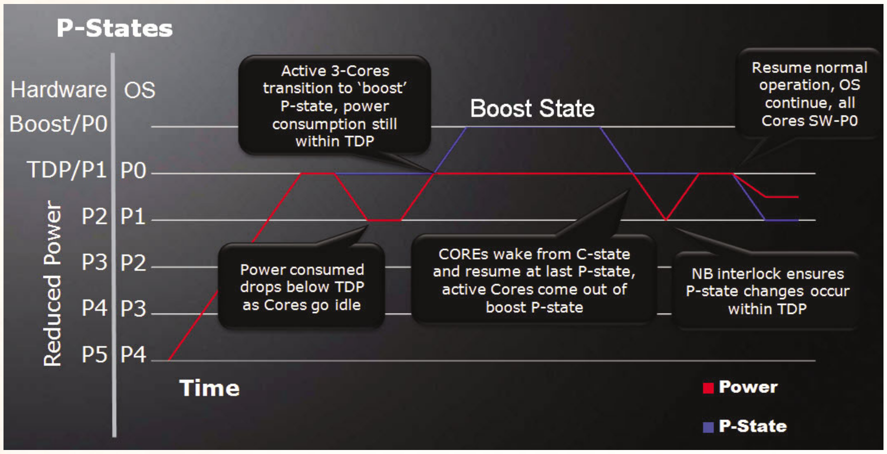
"Many of the refinements in the current generation are subtle," says Solotko, "because it's taking something that's already mature and continuing to



Name	Description	Min. Value	Max. Value	Current Value	Status
☐ CPU Test 0	Test integer calculation and stack operation	0	0	0	Inactive
☐ FPU Test 0	Test floating point calculation	0	0	0	Inactive
☑ Calculation Test 0	Calculation Test				Active
☐ CPU Test 1	Test integer calculation and stack operation	0	0	0	Inactive
☐ FPU Test 1	Test floating point calculation	0	0	0	Inactive
☑ Calculation Test 1	Calculation Test				Active
☐ CPU Test 2	Test integer calculation and stack operation	0	0	0	Inactive
☐ FPU Test 2	Test floating point calculation	0	0	0	Inactive
☑ Calculation Test 2	Calculation Test				Active
☐ CPU Test 3	Test integer calculation and stack operation	0	0	0	Inactive
☐ FPU Test 3	Test floating point calculation	0	0	0	Inactive
☐ Calculation Test 3	Calculation Test	0	0	0	Inactive
☐ CPU Test 4	Test integer calculation and stack operation	0			
☐ FPU Test 4	Test floating point calculation	0			
☐ Calculation Test 4	Calculation Test	0			
☐ CPU Test 5	Test integer calculation and stack operation	0			
☐ FPU Test 5	Test floating point calculation	0			
☐ Calculation Test 5	Calculation Test	0			

Stability test started at 2010-03-12 00:19:07

This is Turbo CORE in action. AMD removed the speed references for competitive, prelaunch reasons, but you can clearly see half of the cores active while the other half are shut down.



This illustration gives you a better sense of the transitions of power and P-states throughout the Turbo CORE process.

improve it. But in terms of speed path optimization, improvements to the northbridge, potential improvements to DRAM performance, and getting the TDP of each individual core in the range needed for a six-core product, those are a lot of the innovations required to deliver a native six-core product to market. You're adding two cores, but you're at a dramatically lower TDP per core."

A few key twists specific to the X6 design are responsible for this seemingly improbable TDP reduction. Some of it has to do with AMD's refinement in ultra low-k dielectric layers. Other tweaks focused on 45nm process improvements and architectural updates, including the addition of processor I/O C-states and optimizations in cache architecture, the die crossbar, northbridge, and improved prefetch logic for six-core operation.

Turbo CORE

Remember Intel's Turbo Boost technology, which dynamically turns off unneeded processor cores while giving a light overclock to remaining cores? Well, with the Phenom II X6, AMD will be trotting out Turbo CORE, which is similar to Turbo Boost in principle but slightly different in execution. Unlike Intel's multiple Turbo Boost configuration options, Turbo CORE has only two: everything on or three on, three off.

"Through extensive research at AMD across applications and suites and all types of consumer software, we've noticed that three cores really hits a sweet spot of tuning when it comes to increasing the frequency of the CPU," Crank says. "As the cores are underutilized in a six-core config, we'll take three cores and boost them up significantly in frequency by several hundred megahertz. This lifts the overall performance of the AMD platform."

The X6 family's boost speed will be up to 500MHz, delivering a free 15% or so frequency bonus right up front if your scenario allows for it. The technology doesn't depend on AMD OverDrive, drivers, or anything else. It's already enabled by default and will stay within each chip's approved voltage and TDP ranges. The general idea is that as cores go idle, total power consumption drops. When the P-state drops from P0 to P1, the three active cores move up into a new, elevated P0 state that does not push power consumption beyond the original P0 threshold. When additional thread bandwidth becomes necessary, idle cores wake up, and the chip reverts to the original P0.

The BIOS update to make AM3 motherboards Phenom II X6-compatible will also have them work with Turbo CORE. AMD has not made any assurances about support for AM2+.

Leo Set To Roar

AMD likes to debut new processor lines as part of a platform. This time around, we have "Leo," consisting of the Phenom II X6, 890-series chipset, and an ATI Radeon HD 5800-series graphics card. These days, AMD typically precedes the word "platform" with "balanced," which is a fancy way of saying that you'll get best results when using wall-to-wall AMD components. When it comes to ATI Stream technology, supported by the Radeon HD 5000-series GPUs, we've found some technical merit in this idea. Compared to Nvidia's CUDA, we've observed Stream to have lower CPU utilization in many instances because the total workload is being shared more effectively between the CPU and GPU.

We've detailed the Radeon HD 5000 series before. Suffice it to say here that AMD wants users to associate the Leo platform with DirectX 11, CrossFireX, and Eyefinity. And again, because Leo supports up to four Eyefinity-enabled graphics cards, each with six attached monitors (once supporting cards arrive). Needless to say, any system with that much real estate to cover is going to need a six-core processor . . . or several.

"On the 890GX platforms," says Crank, "you can have a single graphics card at x16. You can also do two x8s. However, as you move up the stack to the 890FX, which is really where the enthusiast lives, you double your bandwidth to the graphics cards and can do two x16s. You can also do four x8s and get into quad graphics with . . . CrossFireX.

"Then, you couple that with Eyefinity technology. Now you're driving some serious immersive environments—up to 24 monitors."

For those who don't aspire to create an in-home holodeck or game at top speeds, the 890GX will back the platform with integrated ATI Radeon HD 4290 graphics. This still gets you DX 10.1, ATI Stream, and the ability to

Interview With Christopher Neugebauer,

Technical Design Lead For AMD Phenom II X6 Processor

Christopher Neugebauer served as the design lead for the AMD Phenom II X6 and as the silicon evaluation lead once the processor returned from initial production. He has been an engineer at AMD for 18 years.

Q How would you describe the principle design challenges you faced on the Phenom II X6 processor?

CN We had a small team with a tight schedule. We were focused on integrating the improvements we'd made to our six-core designs with the new Turbo CORE feature. We were adding two cores, which naturally lowers the frequency you can achieve within the same power envelope. The challenge was to improve performance on lightly threaded tasks while keeping power in check, and that's where Turbo CORE comes in.

Q How were you able to meet the power and performance challenge with a larger die and two more cores?

CN The addition of ultra low-k dielectric reduced the capacitance in the metal layers and was great in reducing our power envelope at high frequencies. A number of additional core refinements that occurred in the development of the six-core die also contributed.

Q The decision to go with three active cores on a Turbo CORE config seems curious. In the case of a lightly threaded app, why not accommodate having fewer cores in operation?

CN Our performance modeling showed that applications which weren't well-threaded could benefit from boosting one or two cores. We needed to improve the performance of both. For threaded applications, we had added two cores. For single-threaded applications and workloads that only employed one or two cores, we needed to drive more performance—again, all within the same power envelope. The third core in Turbo CORE helped manage operating system interrupts, often single-threaded tasks that the processor must address. That was the origin of Turbo CORE and our three-core implementation. Turbo CORE helped us improve performance for a broad range of client workloads using a combination of highly threaded and less-threaded applications.

Q We've taken a short technical look at Turbo CORE already. Can you add anything else about how the feature manages power states?

CN Sure. We synchronize frequency for each core and voltage across all six cores to enter and exit Turbo CORE. The three "down" cores are reduced to a halt state, and the frequency of the "up" cores is increased to the Turbo frequency. Once in Turbo mode, voltage and frequency are somewhat higher, but the "down" cores consume less power. To transition back to all-core operation, the "down" cores move from the halt state, C1, up to the C0 state, and when voltage has returned from the boost voltage level, those cores become available for additional threaded performance. The synchronization keeps [the Phenom II X6] within the processor thermal envelope or TDP. ▲

expand to a more powerful discrete card if and when needed. The GX also delivers 40 unified shaders running on a 700MHz engine, plus you get the full stack of Avivo HD enhancements for media decoding and playback.

Graphics capabilities aside, the 890 chipset includes the SB850 southbridge. This chip doesn't make the leap to USB 3.0 but does support Gigabit Ethernet, another two lanes of PCI-E 2.0, and, most importantly, six SATA 6Gbps ports. AMD touts SATA 6Gbps as being a key part of the "balanced platform" equation as it helps make sure that storage doesn't become the bottleneck in a high-end configuration.

About Performance

"Where we're going to leave the competition in dust is when you start getting into transcoding and HD video," Crank claims. "When you start playing with 1080p—downloading into one format, transcoding into a different format—you're going to see some significant performance gains in the multiple tens of percent for that application."

When we asked Crank if this statement pertained more to the GPU and Stream than any benefits from the new Phenom's six cores, he answered that both played a role. When apps support it, Stream is effective in offloading highly parallel loads to the GPU, but those tasks can also run well on any highly parallel architecture. That's where having six cores swings into play. Six cores plus Stream, AMD maintains, will be the best way to achieve an optimal configuration for such tasks.

And if you're not cranking on transcodes or similarly parallelized work? Then you'll still have a Phenom II X6 Black Edition to tinker with. AMD states that the X6 BE should "launch right out of the gates" with the other debut X6 parts.

"With this generation," says Davis, "we're going to continue using the Black Edition to . . . provide enthusiasts with tunable performance so they can continue to have fun with these processors. People are already benchmarking the X4 chips at 6.8, 6.9GHz. Systems built on water typically perform very stably at frequencies above 4GHz. We definitely hope that the enthusiast community . . . explores this . . . despite the fact that it voids warranties, corrupts data, and so on."

Davis might joke about overclocking, but the Phenom II X6 is set to be a serious contender for the majority of users who want top-tier performance at mainstream pricing. Time will tell if Intel can match AMD's X6 value proposition. ▲

by William Van Winkle

THE APPLICATION EQUATION

Developers Attempt To Harness The Hardware

These days, it's pretty hard to buy a computer that doesn't come with at least a dual-core processor, yet, ironically, a good deal of software that you use every day isn't fully able to take advantage of both cores completely. In spite of this, most higher-end CPUs have more than just two cores, and sometimes a lot more. AMD offers silicon with three cores, with quad-core chips available from AMD and Intel. Intel is ramping up production of hexa-core CPUs for the power user; AMD will soon follow with its own six-core CPU. But can software really take advantage of these developments in multicore?

Generally, the answer with today's software is a frustrating "Not really, except in limited areas and ways." Not being satisfied with this, we investigated why this is and looked into what the prospects are of our software finally being able to take advantage of our hardware.

Why Multicore Hardware?

A few years ago, Intel's Pentium 4 was the king of the CPU world, and its essentially single-core NetBurst architecture was expected to eventually ramp up to 10GHz and possibly beyond. Of course, this never happened, with speeds topping out at 3.8GHz for the rare Pentium 4 571 and slightly less for the dual-core models that eventually came out. But up until this point, the hardware solution to getting more speed was just to ramp up the MHz or GHz, which was essentially the same solution computing had seen for decades (more on this in a moment).

Only relatively recently have Intel and AMD essentially thrown in the GHz towel in the pursuit of performance. Intel's latest high-end CPU, the thousand-dollar Core i7-980X, runs a clock rate of 3.33GHz with a 3.6GHz Peak Turbo speed when thermal and electrical conditions are right—actually less than the fastest P4 CPU. Instead of GHz, the 980X gets its speed from possessing six cores, which in a perfect world with perfect parallelism might be equivalent to 21GHz in a single-core processor but without the electrical and thermal problems that come with 21GHz. No wonder CPU manufacturers are looking to multicore CPU solutions.

The Software Problem

The traditional GHz growth method was well-known to programmers, and in many programming environments, a common solution to inefficient or slow software was to simply wait for the next generation of hardware to make it faster. Henry Petroski, the noted expert in engineering, industrial design, and failure analysis, is famously quoted as saying, "The most amazing achievement of the computer software industry is its continuing cancelation of the steady and staggering gains made by the computer hardware industry." In other words, programmers have generally responded to gains of processing power and available memory by writing software that uses more CPU cycles and more memory.

Multicore processors throw a monkey wrench into this traditional back and forth between hardware and software. We spoke with John Roberts and David Ziman, two platform specialists for Gearbox Software, developers of last year's breakout hit game Borderlands, to get their take on the complexities of developing software with multicore CPUs in mind.

A lot of nonprogrammers think developing multithreaded programs is as simple as enabling a "multithread = 1" flag in a compiler setting, but, "There's no magic compiler switch that suddenly makes my application multithreaded," says Roberts. Adds Ziman, "There's quite a bit of manual labor involved, especially when the data is not designed appropriately."

The "data not designed appropriately" problem Ziman refers to is simple to envision: Not every task can be readily divided into threads that can be easily divided into multiple concurrent threads, and therefore multiple cores. A classic joke describes the problem thusly: "The man with nine wives can't have a baby in just a month." In other words, some tasks are dependent on a single workflow and cannot be divided.

On the other hand, "there's almost always a way to parallelize a task," Roberts says, "but you really have to separate things and make them as independent as possible." Ziman adds, "[But sometimes] it is cost-ineffective to make it so." When asked if they generally try to use as many threads to do a job as possible, Ziman says, "When we can, we try. It's not easy all the time, given that we are trying to evolve something that isn't multithreaded."

It's Ziman's last remark that leads to a Deep Truth in software development, one that is key to understanding why there are so few truly multithreaded applications.

No Clean Slate

Let's review some facts to set the stage. Windows 2000 has close to 30 million lines of code. Windows XP has about 40 million lines. Vista is said to have close to 50 million. The Linux Kernel follows a similar trend: The 2.6.0 Kernel has 5.9 million lines of code. The 2.6.29 kernel comes in at 11 million lines, and 2.6.32 contains a little less than 13 million lines of code. You almost never hear of new versions of software being smaller, and the main reason is that after a certain point, it's much less expensive for a developer to add new things to an existing code base than it is to start from a clean slate, especially if the software in question is large and complex. It can be said that the code base evolves over time, gaining new features. If the program should happen to become a little slower and consume a little more memory as a result, then the classic conventional wisdom is that new hardware should take care of the problem.

The problem here is that lots of software we use every day has evolved from code bases that were never intended to be multithreaded, but as we mentioned earlier, the speeds of individual CPU cores seem to have hit an upper limit. Without major reworking to make programs truly multithreaded, we'll start seeing software that isn't very much faster, or generates odd pauses at times. For example, open a File Explorer window in Windows 7 and type an FTP URL that doesn't go to an FTP server, such as ftp://microsoft.com. Even on a hexacore-based system, that window won't be movable for a while because the single-threaded process that window inherited from prior Windows versions is stuck awaiting input.

Thankfully, reworking some software to be truly multithreaded "only" takes effort, time, and money. Ziman mentioned earlier that sometimes it is cost-ineffective to rework some code to embrace parallelism, but software developers are going to have to bite the bullet now that single-threaded processing can only happen so fast. Developers have rarely been financially encouraged to optimize code to run faster on multiple cores, but the state of new CPUs may force the issue sooner than anyone thinks.

The Future Of Multicore

So, when you can expect lots of software to fully utilize the power of the multicore CPU in your brand-new PC? Probably not for a few years, but there are points of light on the software landscape.

Optimizing for multicore processors has never been a terribly high priority outside of niche markets, unless it's for software that performs tasks that show obvious benefits with high parallelism. However, as mostly single-threaded applications stop running faster on new processors, or, indeed, actually go slower because the new code grows larger but the speed of individual cores doesn't increase, taking advantage of multiple cores will be a higher priority. This will be especially true when upstart software with no legacy codebase starts competing against older titles that are still mostly single-threaded.

Sometimes parallelism doesn't make much sense for the task at hand because the task requires much larger amounts of RAM than a 32-bit system can access and current PCs can provide. Future advances in RAM and memory bus development, along with widespread acceptance of 64-bit operating systems, will make deploying multithreaded tools a sensible option for developers.

Soon, examples of good parallelism in "typical" software and consumer operating systems will drive consumers to demand it in the new software they buy. We don't think it will arrive soon enough. ▲

by Warren Ernst

Borderlands platform specialists John Roberts and David Ziman sat down with us to discuss the challenges software developers face adapting software to better make use of multicore CPUs. Sometimes the reluctance to move from single- to multithreaded is simply a matter of dollars and cents.

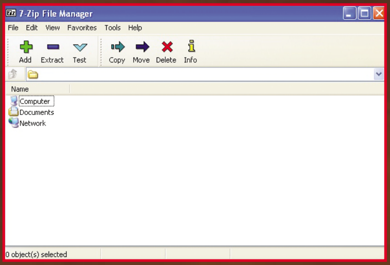
High Points In Multithreaded Software

Right now, we generally see developers going through the effort of creating true multithreaded applications when it is clear that there are significant performance gains to be had over the single-threaded competition. Fortunately, there are some tasks, such as video encoding, that are perfectly suited to high parallelism. As such, we're seeing multithreaded applications in these markets first.

However, we've been pleasantly surprised to find multithreaded applications where we least expect them, too. Here's a rundown of some of the best for your multicore CPU.

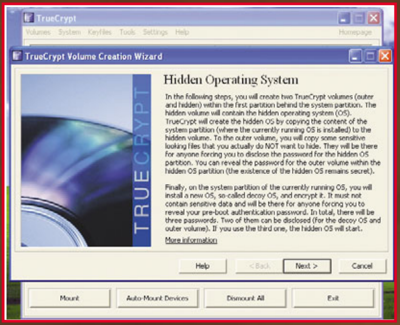
7-Zip

Tools that compress and decompress files are in almost everyone's utility arsenal, but when given ample CPU cores, 7-Zip is blazingly quick at both compression and decompression. Amazingly, doubling the number of cores available basically halves the time needed to compress or decompress large filesets. Compare this to WinZip, which only manages to use one thread for its heavy lifting.



TrueCrypt

We've gone on and on about how great TrueCrypt is, but we didn't realize that as of version 6.0, it was a multicore-friendly application. TrueCrypt will use as many cores as it finds for encrypting and decrypting files on the fly. Header key derivation is also parallelized, meaning that multicore machines will mount and dismount encrypted drives faster, too. Apparently, the algorithms are so efficient that a quad-core CPU encrypts and decrypts literally twice as fast as a dual-core CPU.


TrueCrypt
Volumes System Keyfiles Tools Settings Help
Homepage
TrueCrypt Volume Creation Wizard
TRUECRYPT

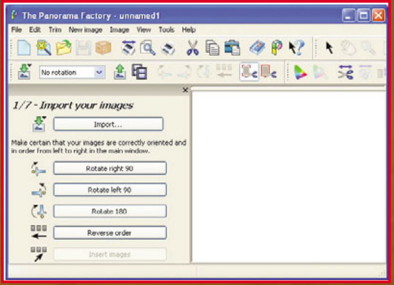
Hidden Operating System

In the following steps, you will create two TrueCrypt volumes (outer and hidden) within the first partition behind the system partition. The hidden volume will contain the hidden operating system (OS). TrueCrypt will create the hidden OS by copying the content of the system partition (where the currently running OS is installed) to the hidden volume. To the outer volume, you will copy some sensitive looking files that you actually do NOT want to hide. They will be there for anyone forcing you to disclose the password for the hidden OS partition. You can reveal the password for the outer volume within the hidden OS partition (the existence of the hidden OS remains secret).

Finally, on the system partition of the currently running OS, you will install a new OS, so-called decoy OS, and encrypt it. It must not contain sensitive data and will be there for anyone forcing you to reveal your pre-boot authentication password. In total, there will be three passwords. Two of them can be disclosed (for the decoy OS and outer volume). If you use the third one, the hidden OS will start.

The Panorama Factory

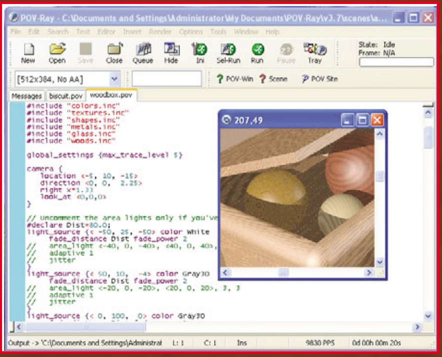
There are a lot of programs out there that will stitch together multiple photos into one seamless panoramic photo or a QuickTime VR Image, but The Panorama Factory can do it much faster than most other programs if your machine is equipped with a multicore CPU. The current version runs on single- and multiprocessor computers, delivering improved stitching speed on multiprocessor systems (including multicore systems) by performing image computations in parallel. Additionally, if you're running Windows 64-bit and have enough memory, The Panorama Factory creates images that are nearly 1,000 times larger than the maximum under Windows XP running on a 32-bit processor, according to its Web site. We'll take their word on it.


The Panorama Factory - unnamed1
File Edit Trim New image Image View Tools Help
No rotation
1/7 - Import your images
Import...

Make certain that your images are correctly oriented and in order from left to right in the main window.

(POV-Ray) Persistence Of Vision Raytracer

POV-Ray is an evolution of a classic raytracing program (it can trace its heritage to the Amiga computer), yet it underwent a massive restructuring in 2008 to make it fully multithreaded. If you're wondering exactly why ray tracing is such a resource-intensive process, allow us to quote SIGGRAPH: "Ray tracing is so time-consuming because of the intersection calculations. Since each ray must be checked against all objects, for a native raytracer (with no speedup techniques) the time is proportional to the number of rays [multiplied by] the number of objects in the scene. Each intersection requires from a few (5-7) to many (15-20) FP (floating point) operations. Thus, for a scene with 100 objects and computed with a spatial resolution of 512 x 512, assuming 10 FP operations per object test, there are about 250,000 x 100 x 10 = 250,000,000 FP operations. This is just for the primary rays (from the eye through the image plane) with no antialiasing. Clearly there are computational problems with this." As such, multicore CPUs enjoy a linear benefit: double the cores and halve the computational time. Because renderings can take days to perform, this is a huge improvement.

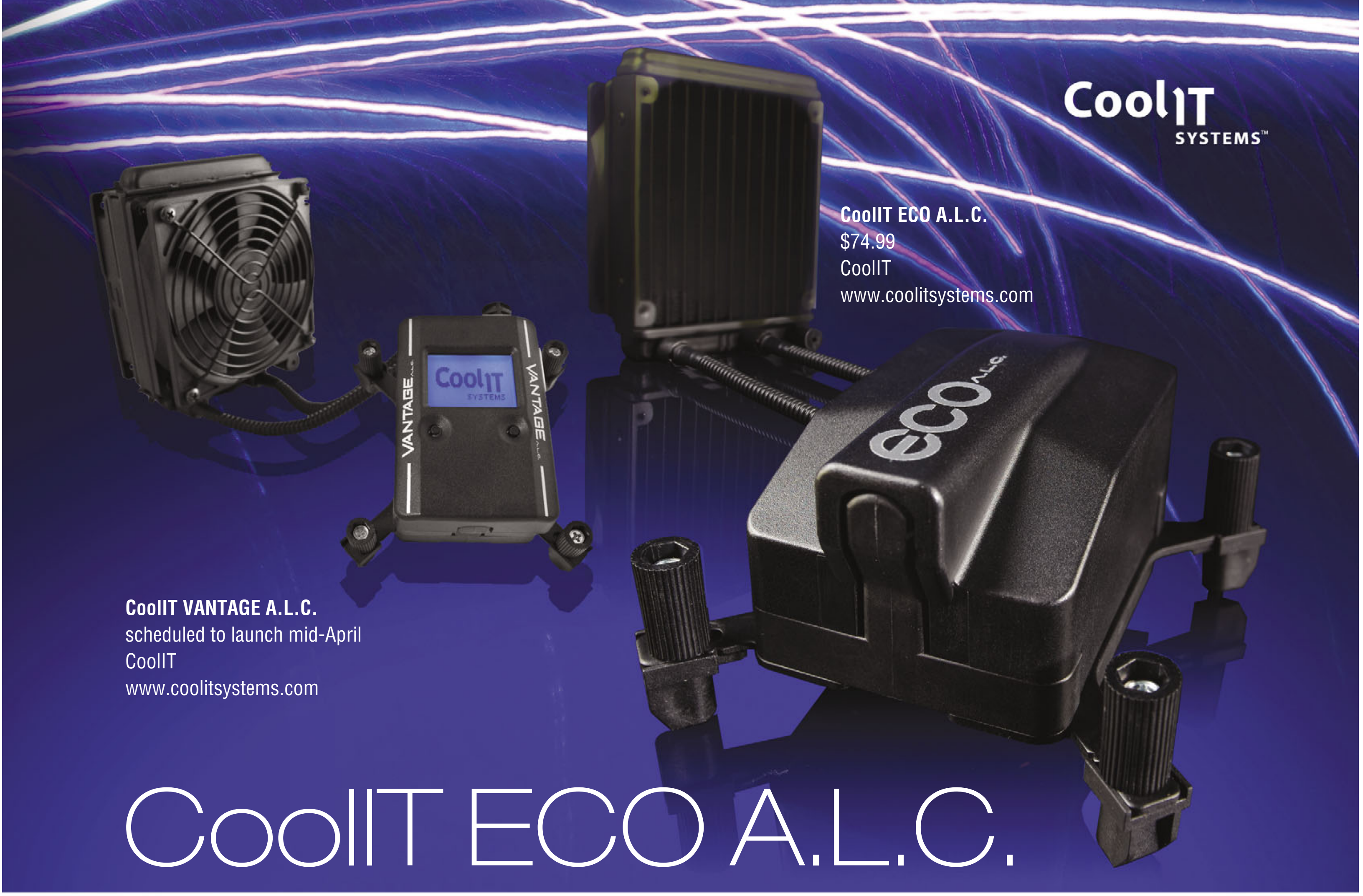

POV-Ray - C:\Documents and Settings\Administrator\My Documents\POV-Ray\v3.7\scenes\a...
File Edit Search Text Editor Insert Render Options Tools Window Help
New
Open
Save
Close
Queue
Hide
Ini
Sel-Run
Run
Pause
Tray
State: Idle
Frame: N/A
[512x384, No AA]
POV-Win
Scene
POV Site
Messages
biscuit.pov
woodbox.pov
207,49

```
#include "colors.inc"
#include "textures.inc"
#include "shapes.inc"
#include "metals.inc"
#include "glass.inc"
#include "woods.inc"

global_settings {max_trace_level 5}

camera {
   location <-5, 10, -15>
   direction <0, 0,  2.25>
   right x*1.33
   look_at <0,0,0>
}

// uncomment the area lights only if you've
#declare Dist=80.0;
light_source {< -50, 25, -50> color White
     fade_distance Dist fade_power 2
//   area_light <-40, 0, -40>, <40, 0, 40>,
//   adaptive 1
//   jitter
}
light_source {< 50, 10,  -4> color Gray30
     fade_distance Dist fade_power 2
//   area_light <-20, 0, -20>, <20, 0, 20>, 3, 3
//   adaptive 1
//   jitter
}
light_source {< 0, 100,  0> color Gray30
```

```
Output -> 'C:\Documents and Settings\Administrat   L: 1   C: 1   Ins   9830 PPS   0d 00h 00m 20s
```

Adobe Production Premium CS4 / Adobe Premiere Pro CS4

Adobe Premiere Pro CS4 is the, ahem, premier timeline-based, real-time video-editing application available for Windows. Odds are if you've ever been impressed with visual effects on a movie or television screen, Adobe Premiere Pro CS4 was involved in some way. Video editing and rendering is one of those tasks that is especially well-suited to parallelization. Rendering HD video frames involves taking a 2-megapixel image (that is, one video frame), performing a bunch of adjustments and filters, writing the frame, and moving on to the next one, but frames themselves can be run in parallel. Premiere was one of Adobe's first multithreaded products, but Production Premium CS4 (a bigger pro-level package that includes Premiere Pro) is so seriously multithreaded that it includes "live metering," which indicates the percentage of activity being performed by each core in real time, providing an instant gauge of how effectively overall processing capacity is being used. For many tasks, this usage approaches 100%. ▲



CoolIT ECO A.L.C.
$74.99
CoolIT
www.coolitsystems.com

CoolIT VANTAGE A.L.C.
scheduled to launch mid-April
CoolIT
www.coolitsystems.com

CoolIT ECO A.L.C.

Advanced Liquid Cooling Made Easy

The “A.L.C.” in CoolIT’s award-winning ECO A.L.C. system stands for “Advanced Liquid Cooling.” Typically, advanced liquid-cooling systems can also represent higher price tags, more difficult installations, and regular maintenance to sustain performance results. The ECO A.L.C. is anything but typical, however. Not only does the system’s proprietary design result in superior cooling, it can be installed in only three steps and features an ultra-low profile size that’s compatible with most PC cases. The fact that CoolIT offers all this and more for a penny shy of $75, however, may be the ECO A.L.C.’s most impressive achievement.

Maintenance Free, Worry Free

PC owners buy advanced cooling systems for one primary reason: to acquire superior parts that produce leader-of-the-pack performance. The ECO A.L.C.’s pre-assembled, factory-sealed parts cover both fronts while simultaneously using proprietary cooling technology and a compact design that falls under AMD and Intel maximum specifications and won’t physically weigh on motherboards as air-cooled systems can.

CoolIT factory-ensures that each ECO A.L.C. part is prepped for performance and durability, meaning the CPU FHE (copper micro-channel); proprietary pump (ceramic bearing, 50,000 MTTF lifecycle); coolant (anti-corrosion, low toxicity, antifungal additives); 12V, 1,800rpm fan; and advanced thermal grease you receive will serve ably for years without continual maintenance required on your part. The ECO A.L.C.’s universal retention system, meanwhile, means it’s easily adjustable to Intel 775, 1156, and 1366 and AMD AM2, AM2+, and AM3 sockets.

The Strong, Silent Type

Accompanying the ECO A.L.C.’s compact design is an emphasis on whisper-quiet operation with less power consumption. Thus, the system’s custom-engineered radiator dissipates heat at peak levels without the distracting noise some advanced cooling systems suffer from. Further, the ECO A.L.C. is suitable for a vast assortment of PC cases accommodating 120mm fan sizes, including increasingly popular small-form-factor boxes.

Affordably Reliable

“Revolutionary” is a word that’s arguably attached too often to things that don’t really deserve the distinction. Where advanced liquid-cooling systems are concerned, though, the ECO A.L.C.’s proprietary approach to leading heat-exchanging performance at an ultra-affordable price actually deserves the “revolutionary” moniker. Expect similar trailblazing in late April when CoolIT launches the lightweight, closed-looped Vantage A.L.C. system with ESP (Extra Sensory Peripherals) technology supporting tools for wireless chassis monitoring and control. ▲

advertisement

The Bleeding Edge Of Software

Inside The World Of Betas

Cobian Backup 10 Beta 10.0.0.687

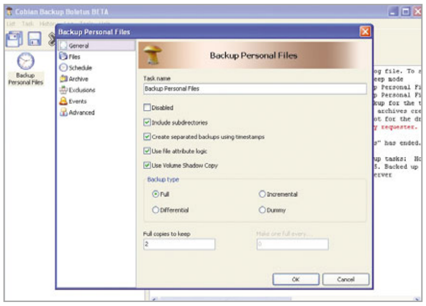
The old joke among computer repair people goes something like this: "There are two kinds of computer users: those who have lost valuable data due to hardware or software problems, and those who are about to." OK, so it isn't a very good joke, but we believe in its underlying message: You need to back up your stuff regularly, or else one day you may find it missing. Although there is no perfect backup solution for all users all the time, Cobian Backup has been a longstanding favorite of ours. The latest beta adds speed and compression options.

Cobian Backup isn't a disk image creator (like Acronis Disk Image), software RAID-like instant archiver (like NTI Shadow), or folder synchronizer (like Microsoft's SyncToy). It's more like a "classic backup/archiver" (rather like NovaBackup) that looks at files and folders at a preprogrammed time, applies logic rules you designate, and then creates a compressed file at a new location that contains all the stuff you wanted backed up. Unlike NovaBackup, Cobian Backup stores files in industry-standard ZIP or 7z files. We'll take these formats over proprietary formats any day.

Cobian works by creating "tasks," which make up a backup job. A wizard-like dialog box walks you through setting backup type (full, incremental, or differential), designating the number of copies to keep, selecting files and folders to back up (including those on FTP servers), choosing a backup file destination, specifying backup options (compression types, split files, encryption, and passwords), setting a schedule (daily/weekly/monthly/on a timer), and so forth. It's surprisingly easy to use, despite all the options.

Frustratingly, the latest version still doesn't write optical media after all these years, but the beta is solid, full-featured, and very quick. It may not be open-source anymore, but it's still free to use, making it worth a look even if your backup needs are casual. ▲

by Warren Ernst



Task name: Backup Personal Files
☐ Disabled
☑ Include subdirectories
☑ Create separated backups using timestamps
☑ Use file attribute logic
☑ Use Volume Shadow Copy
Backup type
● Full ○ Incremental
○ Differential ○ Dummy
Full copies to keep: 2

Cobian Backup 10 Beta 10.0.0.687
Publisher and URL: Luis Cobian, www.educ.umu.se/~cobian/
ETA: Q2 2010
Why You Should Care: If you need this kind of backup, then Cobian is as good as it gets.

True Launch Bar 4.4.6 Beta

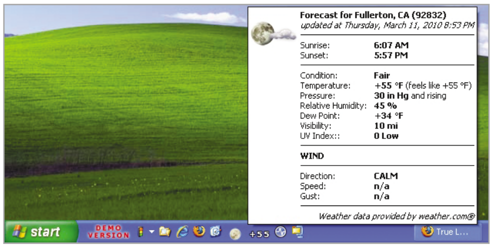
Windows XP's Quick Launch Bar is simultaneously pretty handy and completely useless, depending on who uses it. The Quick Launch Bar is that set of four or five little icons next to the Start Menu that launch programs with a single click. However, a lot of manufacturers turned it off by default. And because it's hard to miss what you don't see (or even know about), a lot of folks never got the chance to play with it. On the other hand, with just room for a few icons, it sometimes didn't suit the needs of users who were aware of its existence. Perhaps because of this, Win7 did away with the Quick Launch Bar completely. If you want it back, or if you want a version of the Quick Launch Bar that is stuffed to the gills with features, then you need to check out True Launch Bar.

First and foremost, True Launch Bar is like a version of the Quick Launch Bar that can contain pop-up menus, allowing for nested icons arranged however you like, almost like miniature Start Menus. It strikes a good balance between littering your Desktop with program shortcuts vs. diving into several layers of menus in the Start menu. Of course, if you just miss the normal Quick Launch Bar in Win7, you can also set up True Launch Bar to look and work just like it.

True Launch Bar has just over 40 plug-ins that add a lot of interesting widgets. A few of the better ones include a Wi-Fi sensor, a weather monitor, a Clipboard manager, a to-do list, a network port monitor, a mail monitor, a news reader, and a motherboard/CPU temperature monitor. Some just display info all the time like a Taskbar Tray icon, while others require a click or mouseover to display info. Either way, it's a good way to get some clutter out of the Taskbar Tray.

The beta is incredibly solid and even fun to use, feeling like a finished app, so enjoy it while it's free. ▲

by Warren Ernst



Forecast for Fullerton, CA (92832)
updated at Thursday, March 11, 2010 8:53 PM
Sunrise: 6:07 AM
Sunset: 5:57 PM
Condition: Fair
Temperature: +55 °F (feels like +55 °F)
Pressure: 30 in Hg and rising
Relative Humidity: 45 %
Dew Point: +34 °F
Visibility: 10 mi
UV Index:: 0 Low
WIND
Direction: CALM
Speed: n/a
Gust: n/a
Weather data provided by weather.com®

True Launch Bar 4.4.6 Beta
Publisher and URL: Tordex, www.tordex.com
ETA: Q2 2010
Why You Should Care: Get back your beloved Quick Launch Bar in Windows 7, supercharged if you like.

UP TO SPEED

Upgrades That'll Keep You Humming Along

It's Classics Month at "Up To Speed," with updates from old faves such as Audacity, UltraEdit, Opera, Everest, and even Yahoo! Messenger.

Software Updates

Audacity 1.3.11 Beta

The legendary freeware audio-editing tool adds provisional support for Windows 7 in this release, but the authors strongly suggest using this version in Windows Vista or Mac OS X 10.6. In addition to providing a higher-res icon file for Windows and a SoundFinder plug-in that can label regions of an audio file, the new version fixes a crash bug when opening Preferences without an attached device. The Windows installer now correctly installs new versions of the program over older ones.

audacity.sourceforge.net

Boxee Beta 0.9.20

The online video aggregation software now sports a TV show library that collects available episodes from online sources and a Movie library that does the same for films. Media sharing is enabled via a live feed of content you and your friends recommend, and you can now post any piece of content you like directly to your Twitter and Facebook pages.

www.boxee.tv

Everest Ultimate Edition 5.30.2043 Beta

The venerable comprehensive system diagnostics suite can now monitor your GPU on a second-by-second basis. AMD's 890GX chipset is now supported, as are the Radeon HD 5830 and Mobility Radeon HD 5650. This update fixes problems getting sensor information on Gigabyte X58A motherboards, motherboard model detection when there were incorrect DMI fields, and problems with System Stability Test/Preferences in Vista.

www.lavalys.com

Maxthon Classic 1.6.7 Build 33

An alternative browser with a strong niche following, Maxthon now shifts program focus to the Address bar when you open a new tab. Among the several fixes, some search engine compatibility problems have been overcome, as has a crash problem when searching. Version 1.6.7 also fixes a problem with the drop-down Address bar not opening the selected address. Pressing ENTER to activate queries in the search box should now function as intended.

www.maxthon.com

Opera 10.50

Among many changes in this version of Opera, the key upgrade is to the Opera Widgets for Desktop, which now can operate as separate processes apart from the browser window and can be installed as discrete programs. Update 10.50 also integrates better with Win7 interface innovations such as Taskbar Jump Lists and Aero Peek. Other application-level features such as password protection, file I/O access, and Desktop shortcuts are now supported for widget programmers.

www.opera.com

Palm Pre webOS 1.4.0

This substantial update for the Palm Pre smartphones is for Sprint customers only. Among the many enhancements is on-deck video editing and a camcorder function in the Camera app. Calendar alerts are customizable. There are two new partial data erasure modes. A new Web feature will add contact info from a page directly to your Contacts. And there are scores more changes in this substantial refresh.

www.palm.com

µTorrent 2.0.1 Beta (Build 18408)

The µTP (micro transport protocol) driving the torrent client now uses less system overhead for increased speed. There are new options for disabling both variable packet size and discoverability. The latest build also fixes a bug that used to cause program freezes when the Web requests to the program were broken.

www.utorrent.com

UltraEdit 16

An old standby for programmers who need a powerful text editor goes to version 16. A new function list has a tree structure for finding and inserting the right item quickly. A new Modify Groups dialog can define unlimited groups, while a Line Change indicator pinpoints where you made the most recent changes. A new command hides or shows all lines containing a specified string. Adding and removing comments to the code is easier, too.

www.ultraedit.com

Yahoo! Messenger 10

The latest iteration of one of the elder statesmen of the instant messaging world improves the overall quality of video calling, now adding fullscreen support. Yahoo! Messenger 10 now includes an Updates view that shows what friends are sharing on Yahoo!, Flickr, and Twitter.

messenger.yahoo.com

Driver Bay

Logitech SetPoint 6.00.68

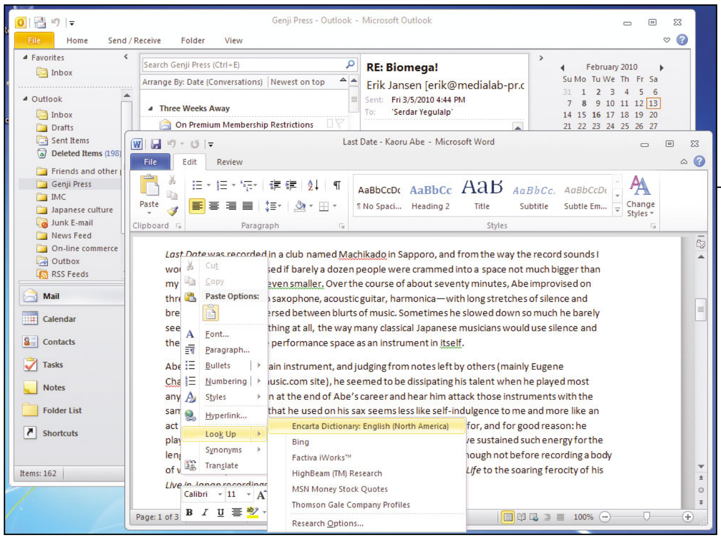
The new drivers and utilities for many Logitech mice models have gone on a diet. The download size of this latest package of drivers is now roughly 60% smaller than previous versions. Logitech has revised the control panels for standard mice and keyboards with a new look. Several bug fixes and other unspecified stability improvements are also included with version 6.00.68.

www.logitech.com

by Steve Smith

The Evolution Of The Office Suite

We Pick The Most Productive Productivity Software



RE: Biomega!
Erik Jansen [erik@medialab-pr.c
Sent: Fri 3/5/2010 4:44 PM
To: 'Serdar Yegulalp'

Last Date was recorded in a club named Machikado in Sapporo, and from the way the record sounds I
wo … sed if barely a dozen people were crammed into a space not much bigger than
my … even smaller. Over the course of about seventy minutes, Abe improvised on
thr … saxophone, acoustic guitar, harmonica—with long stretches of silence and
bre … ersed between blurts of music. Sometimes he slowed down so much he barely
see … thing at all, the way many classical Japanese musicians would use silence and
the … performance space as an instrument in itself.

Abe … ain instrument, and judging from notes left by others (mainly Eugene
Cha … usic.com site), he seemed to be dissipating his talent when he played most
any … n at the end of Abe's career and hear him attack those instruments with the
sam … that he used on his sax seems less like self-indulgence to me and more like an
act … for, and for good reason: he
pla … ve sustained such energy for the
len … hough not before recording a body
of v … *Life* to the soaring ferocity of his
Live in Japan recordings

Office 2010 Beta
Free (during beta)
Microsoft
www.microsoft.com
●●●●

Software can't stand still. It must either evolve or be overtaken. And right now, one of the most common applications on the PC—the personal productivity suite—is facing evolutionary pressure from all directions.

It's not just that Microsoft Office, the long-time king of the office-suite hill, is feeling heat from competitors such as OpenOffice. The whole *concept* of a desktop productivity app may be giving way to online suites accessed through a Web browser. Everyone's feeling change in the wind. Some are choosing to do something about it; some are not.

This rundown, then, isn't just about the newest versions of Office, OpenOffice, and so on. It's about the likely future of each of these programs, based on all the changes taking place in personal computing right now.

Microsoft Office 2010 Beta

Even if Office 2010 is still in public beta at press time, one glance at it gives a good idea of where Microsoft is going with its other flagship product. Redmond is polishing the rough edges that came with Office 2007's radical makeover and preparing Office for its inevitable collision with the world of online-only applications.

If there was one thing about Office 2007 that had everyone arguing, it was Microsoft's new Ribbon interface. Some people loved the Ribbon because it stayed out of their way and let them concentrate on their work, not an interface full of toolbars. But others hated the Ribbon, for plenty of good reasons. It was the *only* interface for Office 2007; you couldn't revert to the old look. It also couldn't be customized. You could only place shortcuts to Ribbon commands into a single toolbar at the top of the program window.

Office 2010 goes a long way toward fixing these problems by making the Ribbon completely editable, including keyboard shortcuts for everything, and bringing back visual cues that people were used to (e.g., the original File menu). In short, they're things Microsoft should've done with the Ribbon from the beginning, even if the Ribbon's presence in many other subsequent apps has made it a little more like a fact of life and less like the design oddity it originally was.

Another major change in 2007 that some people resented was the new XML-based file formats, which weren't backward-compatible. Many simply opted to use old formats, which worked fine in 2007, for compatibility. Office 2010 thankfully continues the tradition of backward compatibility and adds expanded native support for the ODF format, used by competitors such as OpenOffice.org. The bad news is that not all native Office document features can be saved in ODF (something that has riled people on both sides of the aisle), and so Microsoft has little choice but to support both ODF *and* its native formats for the sake of compatibility (and for keeping regulatory bodies at bay).

Versions of Office that haven't sported major changes—a new look and feel, a new application to include in the mix—have typically revolved around minor changes that grant an extra dimension of usefulness. Outlook 2010 has most of the new changes in this regard. New to Outlook are conversational-threading view for messages as well as full use of the Ribbon. (Before, it only appeared in messages and not the main program.) Perhaps most striking is a People Pane for enhanced contact tracking. People have speculated that this feature could be made a front-end for various social networks, another bit of online functionality that Office can't afford to ignore.

The data visualization features in Excel (instant in-cell mini charts) are another attraction, and Word's support for typefaces with advanced ligatures—something normally only seen in professional publishing software—makes the font geek in me happy. No one of these tiny touches will compel people to switch, but they're not meant to. The whole aggregate of them, working in concert, is what's meant to draw people in, and Microsoft has this sort of touching-up down to an art.

Then there are the still-under wraps Web versions of Office, which promise to be free albeit ad-supported, created to keep from losing too much of Office's low-end audience to similar online suites such as Google Docs. The differences between Office Web and the full Office are like a family-sized van vs. a two-seat electric car. The latter's for commuting to the office; the former's for hauling a month of groceries and taking kids to the game. Office Web, along with the also-planned Office Mobile 2010, are meant to be entry-level tools, not replacements for the main edition. But they're also designed to satisfy people with minimal demands.

Microsoft is betting that the full version of Office, in all its different SKUs, continues to draw and keep an audience. It probably will, especially as people discover the limitations of browser-based productivity suites. But Microsoft is also wise to assume it's no longer the only game in town.

OpenOffice.org 3.2

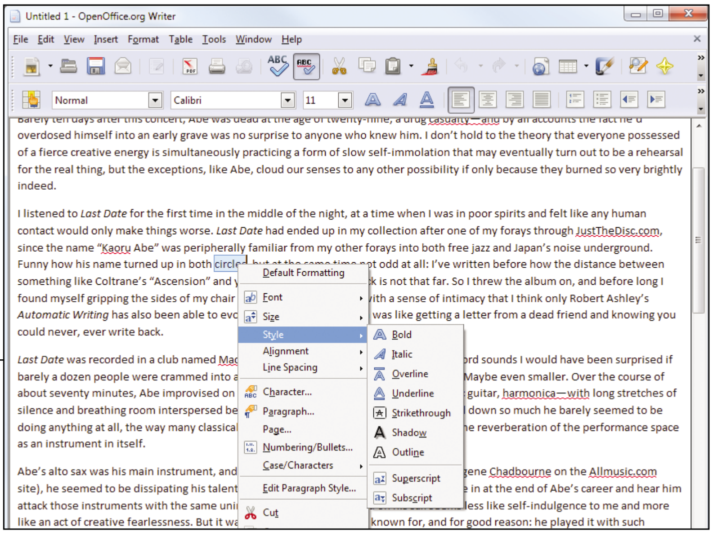
Over the last few years, especially after the release of its 3.0 edition, OpenOffice.org (or OO.o for short) has been touted as *the* alternative to Microsoft Office. It's free to use, open-source, and interoperable with MS Office. Many OO.o proponents cite its lack of a price tag as its big competitive edge against both Office *and* online suites.

That said, OpenOffice hasn't broadly displaced Microsoft Office, certainly not to the point where Office's sales are endangered. People who already use a program with a certain set of features that they're comfortable with tend to continue to use (and pay for) it in one form or another, especially with regard to useful features in MS Office that aren't present elsewhere. To that end, OO.o appeals most directly to people who have minimal dependence on Office as such and have little need for its more advanced functions.

One good reason why those who get the most out of OO.o are those not already attached to Office is document compatibility. Many DOC and DOCX files open just fine in OO.o's Writer, but Writer certainly has its fair share of compatibility wrinkles: The styles for certain paragraph types don't render correctly, some types of auto-numbering turn out wrong, and so on. There's no real way to tell in advance what breaks and what doesn't except by diving in, and then cleaning up the results by hand.

The other programs in the suite follow suit. Calc works very well as a replacement for simple Excel spreadsheets, which is why I've been able to replace Excel entirely with Calc for my own use. Still, I'd be loathe to use Calc when running some of the complex, heavily programmed Excel sheets that are in common use in scientific research and finance. Impress is a perfectly suitable drop-in replacement for creating new presentations, as far as its mix of features goes. Although, again, existing PowerPoint documents don't always open correctly.

Others have taken OO.o's open-source base and derived other products. Go-OO (www.go-oo.org) is a performance- and feature-optimized version of OO.o that boasts faster running time and improved (although not perfected) document compatibility. OxygenOffice (sourceforge.net/projects/ooop) includes bonuses such as clip art, templates, extra fonts, and expanded support for VBA macros. There's also IBM's Lotus Symphony (symphony.lotus.com), a reworking of OO.o with fewer programs in the suite but a classier, more polished interface. And, finally, for those who want a paid-support version of OO.o, Sun (now Oracle) has StarOffice (www.sun.com/software/staroffice) starting at $49.95 a seat.



overdosed himself into an early grave was no surprise to anyone who knew him. I don't hold to the theory that everyone possessed of a fierce creative energy is simultaneously practicing a form of slow self-immolation that may eventually turn out to be a rehearsal for the real thing, but the exceptions, like Abe, cloud our senses to any other possibility if only because they burned so very brightly indeed.

I listened to *Last Date* for the first time in the middle of the night, at a time when I was in poor spirits and felt like any human contact would only make things worse. *Last Date* had ended up in my collection after one of my forays through JustTheDisc.com, since the name "Kaoru Abe" was peripherally familiar from my other forays into both free jazz and Japan's noise underground.
Funny how his name turned up in both circle … ot odd at all: I've written before how the distance between
something like Coltrane's "Ascension" and y … k is not that far. So I threw the album on, and before long I
found myself gripping the sides of my chair … ith a sense of intimacy that I think only Robert Ashley's
Automatic Writing has also been able to evo … was like getting a letter from a dead friend and knowing you
could never, ever write back.

Last Date was recorded in a club named Mac … ord sounds I would have been surprised if
barely a dozen people were crammed into a … Maybe even smaller. Over the course of
about seventy minutes, Abe improvised on … guitar, harmonica—with long stretches of
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Abe's alto sax was his main instrument, and … gene Chadbourne on the Allmusic.com
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OpenOffice.org 3.2
Free
OpenOffice.org
www.openoffice.org
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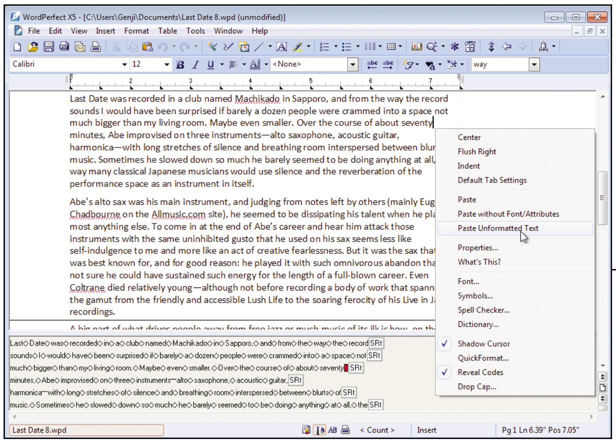
Corel WordPerfect Office X5

Back in the DOS days, WordPerfect was one of *the* big word processors, but time and the popularity of Microsoft Office have not been kind to its market share. After changing ownership several times, the WordPerfect suite ended up in the hands of Corel, where it's continued in its tradition of appealing to longtime WordPerfect users, but few others. Hence, for instance, the plethora of document filters for archaic DOS-era formats such as XyWrite, WordStar, etc. The current version takes a few stabs at winning back some users, but they're catch-up features, not game-changers or eyebrow-raisers.

When you launch WordPerfect, it greets you with options to style the program's interface one of four ways: WordPerfect Mode, Microsoft Word Mode, WordPerfect



Last Date was recorded in a club named Machikado in Sapporo, and from the way the record
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way many classical Japanese musicians would use silence and the reverberation of the
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Abe's alto sax was his main instrument, and judging from notes left by others (mainly Eug
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most anything else. To come in at the end of Abe's career and hear him attack those
instruments with the same uninhibited gusto that he used on his sax seems less like
self-indulgence to me and more like an act of creative fearlessness. But it was the sax that
was best known for, and for good reason: he played it with such omnivorous abandon tha
not sure he could have sustained such energy for the length of a full-blown career. Even
Coltrane died relatively young—although not before recording a body of work that spann
the gamut from the friendly and accessible Lush Life to the soaring ferocity of his Live in J
recordings.

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Last◇Date◇was◇recorded◇in◇a◇club◇named◇Machikado◇in◇Sapporo,◇and◇from◇the◇way◇the◇record SRt
sounds◇I◇would◇have◇been◇surprised◇if◇barely◇a◇dozen◇people◇were◇crammed◇into◇a◇space◇not SRt
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minutes,◇Abe◇improvised◇on◇three◇instruments—alto◇saxophone,◇acoustic◇guitar, SRt
harmonica—with◇long◇stretches◇of◇silence◇and◇breathing◇room◇interspersed◇between◇blurts◇of SRt
music.◇Sometimes◇he◇slowed◇down◇so◇much◇he◇barely◇seemed◇to◇be◇doing◇anything◇at◇all,◇the SRt
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WordPerfect Office X5
$249.99
Corel
www.corel.com
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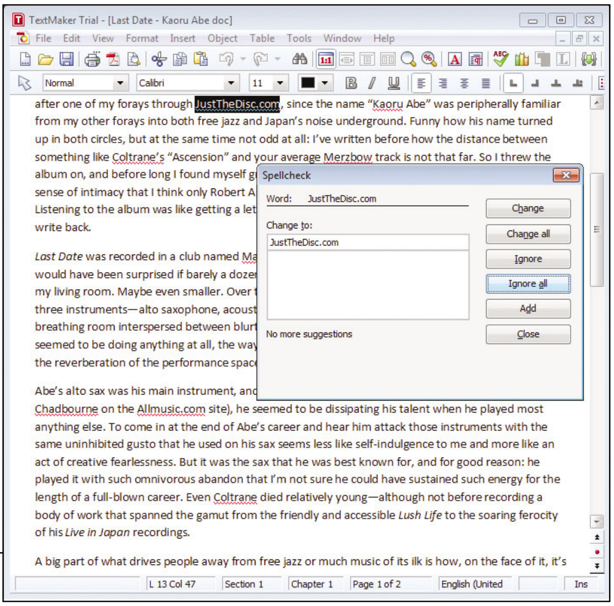

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length of a full-blown career. Even Coltrane died relatively young—although not before recording a
body of work that spanned the gamut from the friendly and accessible *Lush Life* to the soaring ferocity
of his *Live in Japan* recordings.

A big part of what drives people away from free jazz or much music of its ilk is how, on the face of it, it's

Word: JustTheDisc.com

Change to: JustTheDisc.com

No more suggestions

SoftMaker Office
$79.95
SoftMaker
www.softmaker.com
●●●◖

Classic Mode (which emulates the 5.1 DOS version), and Legal Mode (as WordPerfect has long been widely used in law offices). The spreadsheet program Quattro is the same way, with interface options for Quattro, Excel, or Lotus 1-2-3 users. This isn't a bad idea, but earlier versions of the product seemed to rely on that and little else as a selling point.

Office X5 adds some new things that nudge the suite more toward being online-aware. I did like X5's SharePoint integration, where you can use the Save dialog to upload files to SharePoint, with document check-in/out support and version tracking built in. Also useful is the ability to pull data from a Web service and include it as a live macro variable in a document. The text-to-PDF and PDF-to-text functions are handy, too.

WordPerfect's biggest backward-compatibility asset has been the multitide of document types that it can read and write. Legacy documents such as classic DOC files tend to work best, although Corel has attempted to improve support for DOCX and ODF. Unfortunately, it's not much better than it was in X4, which crashed constantly when importing various file types. X5 doesn't crash as much as its predecessors, but I still had some quirks: Some relatively simple documents from Word showed strange formatting issues that didn't appear in OpenOffice.

There are signs that Corel is trying to shake the dust off WordPerfect. But a good deal of why WordPerfect continues to be used at all mostly revolves around legacy support for existing users, not staking out new territory. To that end, WordPerfect needs to find new reasons to exist beyond its historical appeal. And although X5 shows some movement in that direction, it's not nearly enough.

SoftMaker Office

Finally, there's SoftMaker Office, an out-of-nowhere contender that has garnered great accolades and might serve as a model for other, low-priced productivity suites. It only sports three programs—a word processor, a spreadsheet, and a presentation app—but they all reliably deliver what's needed. I suspect many more products like SoftMaker might rear their heads in time, especially now that MS Office has broad documentation for both its legacy binary and new XML-based formats.

The creators of SoftMaker Office are clearly banking on winning over people fed up with MS Office's price and OpenOffice's compatibility quirks. Both Word and ODF format documents open a lot more accurately than they do in WordPerfect or even OpenOffice. (ODF spreadsheets are not supported, though.) The program's native export to PDF option also lets you include a full copy of the original document. I assumed this meant any PDF reader that could recognize attachments would be able to see the document, but it apparently only means the resulting PDF can be opened natively in SoftMaker Office.

The feature mix of each program is also solid: What is there works extremely well, and, for most people, that matters more than many unused features or a common subset of features that don't work properly.

That said, as a Microsoft Office user, I miss some things. SoftMaker doesn't have Word's contextual spelling, for instance, something I have a hard time working without.

The program's liberal use policy also makes it appealing for families and individuals. The suite can be installed on up to three PCs at once or run from a USB drive because there's no copy protection. There's even a 30-day trial version. A suite this cheap and well-designed is an argument for how high-end office products *and* free

Web apps will both face strong competition from smaller, more agile outfits.

AbiWord 2.8.2

We'll be up-front with you: Of the programs featured in this roundup, AbiWord 2.8.2 is merely a word processor. But the software is simple by design—a free, open-source word processor with basic but highly reliable features. It's only moderately more sophisticated than Microsoft Windows's WordPad, for example, but it also serves as a simple case study for how desktop applications may be turning into elaborate interfaces for various kinds of online services.

From the outside, AbiWord casually resembles earlier versions of Word for Windows, with its dragable toolbars and the general behavior of the interface. Most of the common features you'd expect are included, from correct-as-you-type spell-checking to more sophisticated things such as importing equations from LaTeX documents. A small collection of plug-ins included with the program let you make use of Wikipedia, look up words in the URLDict online dictionary database, or read/write documents generated by other programs.

Some things common to other suites are missing, however. Native export to PDF isn't included in the current version (it's planned for a future release, though), and the only plug-in written to do this for AbiWord hasn't been maintained in quite some time.

But AbiWord's biggest problem is document compatibility. It reads and writes most every common word processing document, although it reads them more reliably than it writes them. Of the formats I used in AbiWord, it most reliably handled Microsoft Word's legacy DOC format. ODF documents created or saved in AbiWord didn't open correctly in other programs: Both Word and OpenOffice complained about the document in question being malformed. Trying to open one simple ODF created in OpenOffice even caused AbiWord to crash. DOCX files didn't work all that well either, often losing font declarations in styles or producing inexplicable formatting problems. To that end, anyone using AbiWord may want to simply default to DOC files as the standard format, because it's both widely used by others and well-supported by the program itself. (AbiWord has its own native ABW format, but few other programs read it.)

New to the 2.8 iteration of AbiWord is a service, AbiCollab, where users can share documents using AbiWord as the interface. The service isn't just a dropbox for files; it's a way for people using AbiWord to edit the same document interactively, in real-time. Changes made by any user show up in all users' copies of the document as they are made, with each user distinguished by a different color. If you don't want to use AbiCollab as the document sharing mechanism, you can direct-connect to another AbiWord user via TCP/IP—perfect for local networks, although connecting to someone across the Internet may require some fumbling with firewall settings. (Using AbiCollab obviates that.)

What's worth asking is whether people would rather edit this way vs. using in-document change tracking and sending copies back and forth. The latter method has the advantage of being something each person can do on their own time. In that way, interactive editing might be *more* cumbersome, not less. But in time, we may see many more programs like this, both open-source and proprietary, where the lion's share of functionality is not in the program itself (because many like it might already exist) but in the services, for-pay and for-free, that it gives you access to.

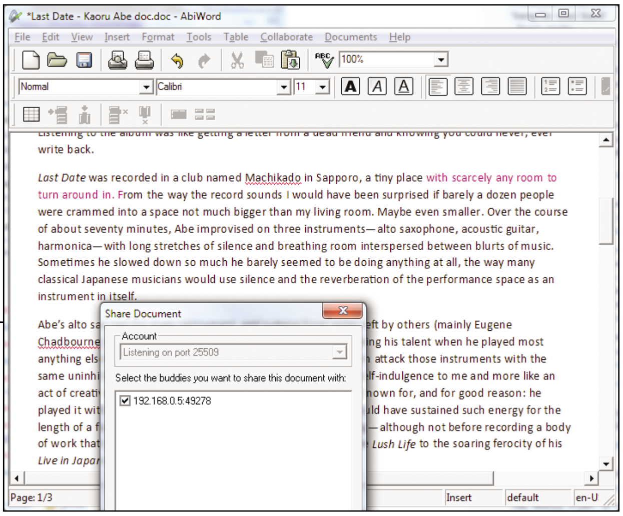
Conclusions

The most striking thing about today's productivity apps is how, despite a price race to the bottom (with OpenOffice.org in the lead, sporting a price tag of $0), full-blown suites such as Microsoft Office still sell well. If you can obtain 95% of the functionality of Microsoft Office for free, what's the real value in buying it?

Maybe the best way to answer that question is to ask its obverse: Why go with a free program when it might end up limiting your options due to missing crucial features or poor document format support? For someone who has little need for absolute backward compatibility, free is good. For someone who needs that and can't work without it, paying for an office suite is money well spent.

What's also important to realize, especially when thinking about how these programs can keep online services at bay, is that the desktop itself isn't as doomed as it might seem. It still provides a kind of work experience that's hard to duplicate elsewhere. That explains why, on the whole, office apps are either only edging toward online integration or implementing it as a complementary, not replacement, solution. Web sites and portable devices may flank it or create adjuncts to it, but they have a hard time replacing it. Try typing an article of this length on your phone keyboard, and you'll quickly see why the desktop office suite as we've known it may still be with us for a good long time to come. ▲

by Serdar Yegulalp



write back.

Last Date was recorded in a club named Machikado in Sapporo, a tiny place with scarcely any room to turn around in. From the way the record sounds I would have been surprised if barely a dozen people were crammed into a space not much bigger than my living room. Maybe even smaller. Over the course of about seventy minutes, Abe improvised on three instruments—alto saxophone, acoustic guitar, harmonica—with long stretches of silence and breathing room interspersed between blurts of music. Sometimes he slowed down so much he barely seemed to be doing anything at all, the way many classical Japanese musicians would use silence and the reverberation of the performance space as an instrument in itself.

Abe's alto sa … eft by others (mainly Eugene
Chadbourne … ing his talent when he played most
anything els … n attack those instruments with the
same uninhi … lf-indulgence to me and more like an
act of creati … nown for, and for good reason: he
played it wit … uld have sustained such energy for the
length of a f … —although not before recording a body
of work that … *Lush Life* to the soaring ferocity of his
Live in Japar

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CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ● ● ◖ 2.5 = ABSOLUTELY AVERAGE | ● ● ● ● ● 5 = ABSOLUTELY PERFECT

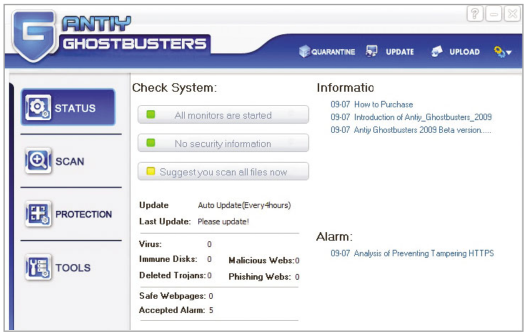
Antiy Labs Antiy Ghostbusters 6.5.3.0

Based on past reviews, you might think we only look at the big names in security software—the Nortons, the ESETs, the Kasperskys, etc. But there are literally dozens of security suites available from outfits you've never heard of before. Don't any of these deserve their time in the sun? So, hoping for the best, we ran Antiy Labs' Antiy Ghostbusters through our barrage of tests, including tests for speed, usability, and effectiveness against nasties. And despite a name that had us humming a certain movie's theme song all week, there's no avoiding the fact that even among free security tools, there are many better choices.

Though Ghostbusters initially looks pretty, its interface and installer have a few typos, and some of the explanatory sentences are just this side of gibberish. For example, one dialog box said, and we quote, "Notes: Found Tools in the interface of AGB2009, and click Windows Policies Opmization (sic) Tool to enhance the safety of your system." This doesn't instill a lot of confidence. In fact, it's usually what you see in bogus security software that is actually malware in disguise.

We're able to make direct comparisons of AGB to various polymorphic scamware items because AGB let us download and install them without a problem. Attempts to clean them failed completely. Truthfully, even a few well-publicized commercial security products failed this test in our last roundup, but none of the top-rated security products did. ABG caught 80% of the more ordinary viruses in our zoo with a manual scan, but it never blocked us from downloading or saving them.

In terms of speed, AGB is fairly good, generating better than average scores in 3DMarkVantage and in Counter-Strike: Source frame rates, but the boot time was twice as long as McAfee's suite.



Check System:

All monitors are started

No security information

Suggest you scan all files now

Update Auto Update(Every4hours)
Last Update: Please update!

Virus: 0
Immune Disks: 0
Malicious Webs:0
Deleted Trojans:0
Phishing Webs: 0

Safe Webpages: 0
Accepted Alarm: 5

Informatio
09-07 How to Purchase
09-07 Introduction of Antiy_Ghostbusters_2009
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Alarm:
09-07 Analysis of Preventing Tampering HTTPS

Antiy Ghostbusters 6.5.3.0
Free
Antiy Labs
www.antiy.net
●●

Other than a fun, original product name, there's little to recommend in Antiy Ghostbusters. We suggest you steer clear. ▲

by Warren Ernst

Reimage PC Repair 1.3.5.4

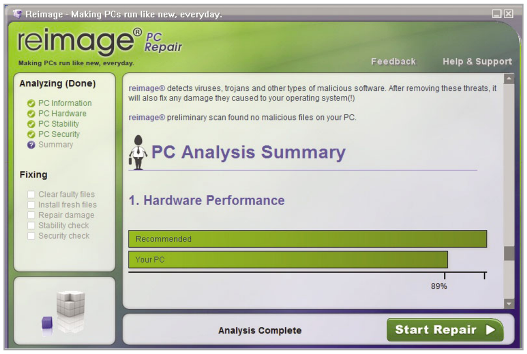
How does one approach "PC fix-it software" that describes its internal workings somewhat oddly, employs an unusual pricing scheme, uses on-screen language not entirely unlike scam software, and comes from a company you've never heard of located on the other side of the world? They write about this sort of thing in the "Software Reviewer's Handbook"; it mentions a 10-foot pole. The only problem with this negative approach is that Reimage PC Repair actually works, at least in our tests with a PC facing rather serious software problems.

PC Repair 1.3.5.4 starts off with a "free scan" of your system, which evaluates your hardware (including free drive space, CPU speed, and available memory), along with your software. The latter includes the condition of your Windows operating system along with a check of all the programs running in the background. Using what it calls a "Spare Parts Repository," but what seems to us to be merely a large online library of Windows and other program files, PC Repair's scanner detects problems with the files on your system, along with viruses and other malware that shouldn't be there, and replaces broken or missing files with those from its repository. At least it will do all that once you pay after the scan, for either one ($47.95), three ($69.95), or 10 fixing sessions ($139.95). One session is good for one repair, and if it's unsuccessful, you may email the company for a refund.

We let it loose on two Windows 7 installations ravaged with different viruses and modern polymorphic scamware-style malware, some of which foiled a few of the full AV suites we reviewed last winter. After a lengthy cleaning process, both installations were clean and ready for action. For unbootable machines, using a previously made PC Repair boot CD starts the process, but you must have a Windows XP Pro CD available to make it, which is a serious drawback. (Note to developers: Use Linux.)

Although intriguing and successful, the requirement to purchase individual repair passes seems a bit spendy, especially when top-rated security suites can clean equivalent problems again and again for about the same annual price. ▲

by Warren Ernst



reimage® detects viruses, trojans and other types of malicious software. After removing these threats, it will also fix any damage they caused to your operating system(!)

reimage® preliminary scan found no malicious files on your PC.

PC Analysis Summary

1. Hardware Performance

Analysis Complete

PC Repair 1.3.5.4
$47.95 (1 session)
Reimage
www.reimage.com
●●●◖

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●◖ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

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Open Sores

Lightweight Linuxes

Linux distros come in a variety of flavors, each for a slightly different audience and purpose, including a number of very small ones. These slim distros are designed for a number of uses, including running low-cost educational platforms (such as Sugar On A Stick, an offshoot of the OLPC project; www.sugarlabs.org), embedded devices, and smartphones.

Several of these distros are live versions of Linux designed to run off of a CD or USB flash drive in case of a hardware malfunction. Using a live version of Linux can be handy for fixing a variety of problems on a sick computer—all you have to do is boot from the removable media. Others, such as DSL (Damn Small Linux; www.damnsmalllinux.org), are also ideal for running on old computers that can't handle a full-fledged modern operating system.

However, some small Linux distros are the type of OS that fit neatly between full-scale desktop and notebook operating systems and OSes created specifically for mobile devices such as smartphones. Geared toward Web apps and entertainment—with a dollop of productivity capabilities mixed in—these lightweight distros present some interesting solutions for tweener computing.

Netbooks & Tablets

Of course, I'm referring to Linux for netbooks (and within a few months, probably the tablet market, as well, as iPad killers crop up all over the place).

I know what you're thinking, and I feel the same way: Netbooks? Yawn. Tablets? Yeah, we'll see about that. But hang with me here.

Netbooks initially suffered from hardware that was too weak to handle XP and Vista in a useful way; now that the hardware's maturing a bit, adding the expense of those proprietary operating systems to even the cheapest netbooks makes them too costly to warrant serious consideration as a companion to your PC. Even if you lop off a big chunk of the purchase price by getting a netbook running Ubuntu, you're still left with an OS that wasn't designed for a device with such meager specs.

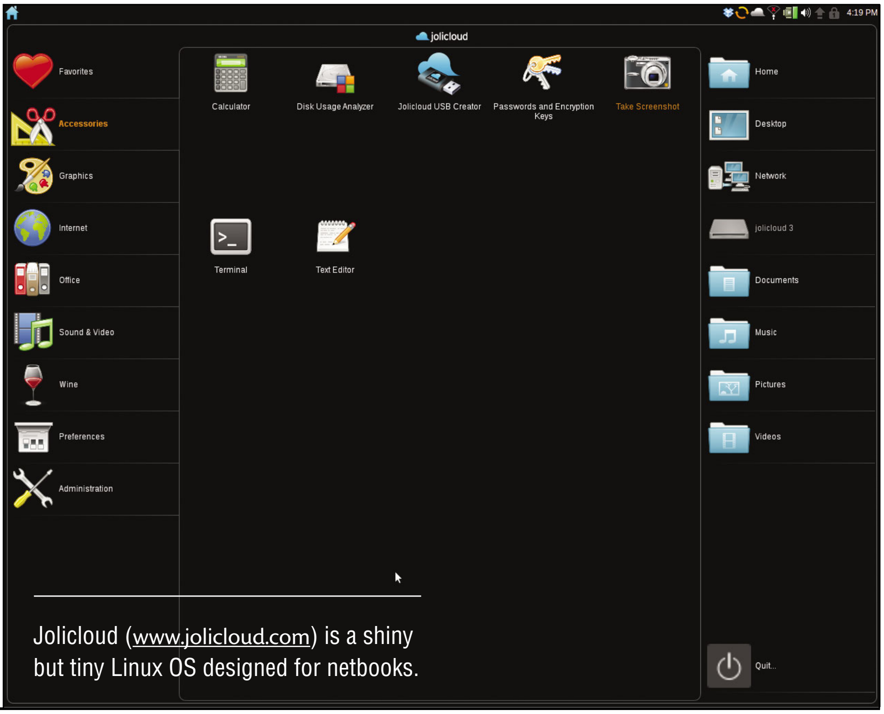
Now that tablets are back in season, they'll likely be facing the same conundrum. The iPad, for example, runs a slightly tweaked version of the iPhone OS and not Mac OS X for a reason.

These tiny Linux distros close the performance gap between netbooks/tablets and PCs. They're not designed as hamstrung versions of "full" operating systems, nor are they optimized versions of mobile OSes. Instead, they're lean operating systems that have been completely rethought for small, mobile computing devices, requiring much less in terms of hardware resources and designed to browse the Internet and utilize cloud applications. The result is what netbooks and iPad-killer style tablets were always meant to offer: an inexpensive, to-go computer.

Beyond The Performance Gap

Solving the performance problem is only one aspect of tiny Linux distros, though. They really challenge our notions of what operating systems look like on a computer in that the primary workspace is more "dashboard" than "desktop."

Optimized for smaller screens, essentially all of these lithe distros make heavy use of tabs and icons for navigation, and as a result, virtually no application or tool is more than a click or two away. And because they're designed as Web-centric OSes, the method for adding applications is as simple as finding the programs you like in a database and checking a box.



Jolicloud (www.jolicloud.com) is a shiny but tiny Linux OS designed for netbooks.

Some distros, such as Ubuntu Netbook Remix (www.ubuntu.org) and Jolicloud (www.jolicloud.com)—which is clearly based on Ubuntu Netbook Remix—maintain some features of traditional desktop OSes, such as file browsers and Documents, Music, Pictures, and Videos folders. However, distros including Moblin (www.moblin.org) and those built on the Chromium OS have stripped out those old OS standbys in favor of a simpler, more compact GUI.

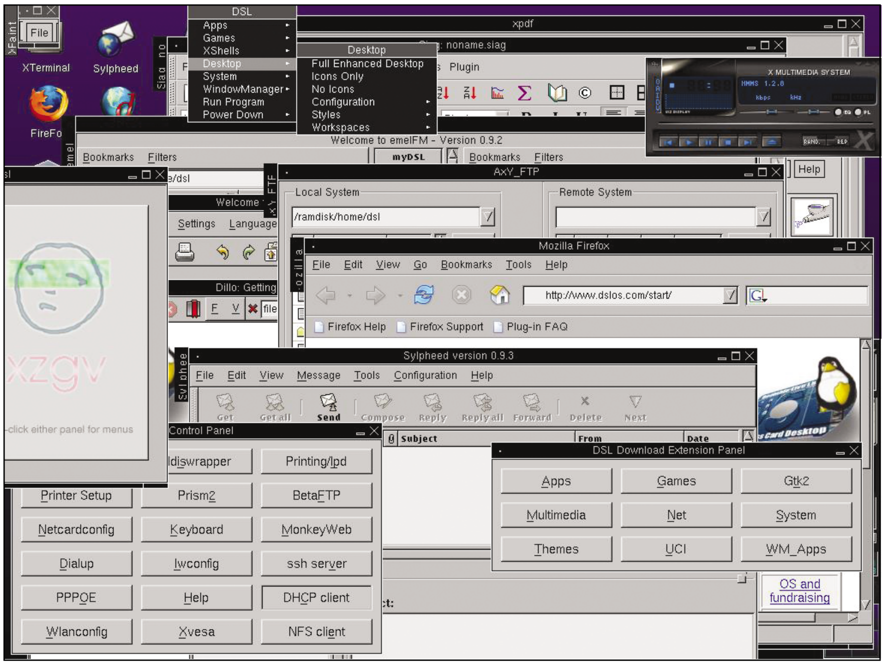
One note concerning Chromium OS: The code is available, but Google Chrome OS—the final product based on Chromium OS that Google will unveil later this year—is still under development. However, there are some decent Chromium OS builds available. A mysterious youngster by the name of Hexxeh keeps pumping out distros, the most recent of which is called Flow (chromeos.hexxeh.net). If you want to sample what Chrome OS might be like, Hexxeh's Flow is an easy one to set up and try out.

Flow and Moblin differ from Jolicloud and Ubuntu Netbook Remix in that they're even simpler. That said, for what they portend to accomplish as operating systems, they don't feel weak or limiting. Instead, they're great examples of what we really need from a netbook—Web apps and Internet access. They're refreshing to use, really, except that Flow is still pretty slow and buggy.

If you want to sample what Chrome OS might be like, Hexxeh's Flow is an easy one to set up and try out.

A Great Deal

With one of these sweet little OSes loaded on it, you can have a netbook that does basic tasks and runs Web apps with ease for $200 or $300. And isn't that what "lite" computers are really all about anyway?



Small Linux distributions such as Damn Small Linux (www.damnsmalllinux.org) are ideal for recovering systems or for running on old computers.

Assuming the impending slew of tablets are equally affordable and are not preloaded and locked with proprietary operating systems (ahem, iPad), these lightweight OSes would be ideal for tablets, as well. Of course, developers would need to build in touch capabilities for that to work, but let's assume they can do that; the interfaces of these small Linux distros are designed for it.

As an aside, one especially compelling feature that these distros share is that they all support Flash—something that the iPhone OS notoriously lacks.

Tech Support Relief

Another great use for a simple, colorful, easy-to-use Linux OS is as a computer for those who aren't very comfortable with computers and can be a constant threat to their machines. If you're a regular *CPU* reader, there's a good chance you're the go-to guy or girl in your family or circle of friends when people need computing advice or help. And you may have noticed over the years that many of the worst computer disasters are caused by users who unwittingly wander into some area of their computer where they have no business being, which is surprisingly easy to do on a PC.

A tiny Linux distro is perfect for those people; they're intuitive and easy to use, provide access to a slew of Web-based apps, and are a lot harder to screw up. Give that spectacularly tech-ignorant loved one a sweet little netbook loaded with one of these OSes, and never again will he or she call you saying, "I was deleting some stuff from the Registry, and…"

Usefulness aside, it's just plain cool (well, nerd cool) to have a complete operating system on a flash drive that you can whip out at any time and run live on virtually any computer, or to have a little-known but fully functioning, stable, and slick-looking lightweight Linux OS on a netbook or other mobile device. ▲

by Seth Colaner

by Rob "CmdrTaco" Malda

arsdidit.txt

Recently, the people behind the popular tech news Web site Ars Technica demonstrated on a large scale something that so far has only been attempted on more obscure sites. They coded up detection for ad blockers and demanded that users of the site disable their ad-blocking software before continuing to read the free contents of the site.

This unsurprisingly met with anger from their users and was soon discontinued. But the gauntlet has been thrown down, and everyone should be ready for the next battle.

Ad blockers are the bane of the free content publisher's existence. As Internet traffic grows, the value of an individual impression continues to fall; readers are increasingly desensitized to the advertising on the sites they read daily. This in turn leads advertisers and Web sites to use ever more intrusive ads to try to squeeze out more clicks, which prompts readers to install ad-blocking software. You can almost hear "Circle of Life" playing in a minor key in the background.

To be clear, ad blockers work really well. Most of the top Web sites are so cluttered with blinking, flashing ads that it's hard to fault a user for wanting a bit more focus. But this raises classic ethical and legal debates: Do ad blockers violate sites' terms of service? What if the user doesn't want to harm a site but finds it unusable? Extreme Web sites play office-disturbing noise without any interaction. Some ads take so much bandwidth that slower Internet connections slow to a crawl, while others simply squander CPU cycles, causing fans to spin up and, in the case of laptop users, a bit of lap burn.

I'm not here to justify the ad blockers, but the reasons aren't going away. Greedy corporations want their charts to go up and to the right each quarter, and they are left with few options. Actually, detecting ad blockers isn't that difficult; JavaScript can detect the existence of objects on a page and prevent display. I first saw this used many years ago and was impressed with the cleverness of the idea, but the site itself was nothing anyone would notice. Just a random tech blog that nobody ever read . . . and undoubtedly even fewer read with its brilliant ad blocker blocker in service.

Rob "CmdrTaco" Malda is the creator and director of the popular News for Nerds Web site Slashdot.org. He spends his time fiddling with electronic gizmos, wandering the 'Net, watching anime, and trying to think of clever lies to put in his bio so that he seems cooler than he actually is.

But Ars is a big site. It has millions of readers and a real budget and creates good content that folks actually want to read on a daily basis. If Ars does this, it is clear that the CNNs and MSNBCs of the world will soon follow. And where Ars retracts and makes a point, its followers will greedily stomp onward.

Estimates of junk buster usage are tough to nail down, ranging from 1 to 50%, depending on who you trust and what site you are reading. Like most things online, the tech sector bears the brunt of it. I imagine sites such as Ars and Slashdot have more junk busters per thousand users than general purpose sites such as Weather.com. But these sites set the trends: What the techies are doing now, the rest of the world will adopt a few years from now.

Of course, this whole issue may be moot anyway: The content publishers have always struggled with this kooky free Web advertising model. They have long been looking for an escape strategy that puts more control into their hands. That is the promise that Apple's iPad holds over them: a compelling platform that they can control from top to bottom. Instead of using generic standards such as HTML and open-source Web browsers, simply loading the NYTimes iPhone application will guarantee that the page they create on their end looks identical on your end.

The real question now is if that genie can be put back in the bottle. The advanced news consumer has migrated to Facebook or RSS readers. We care less about *The Wall Street Journal* and *The New York Times* than we do about each individual news story. We simply want the best piece of content on a subject with far less regard for the source. So will users be willing to adopt these customized readers if it locks them into a single source?

Ad blockers are here to stay, but I expect that in the next year they will need to be increasingly sophisticated to keep up with escalating antiblocking tactics employed by the content owners, who will also increasingly look to locked-down platforms to give them control over your screen. But the tighter they squeeze, the more users will slip through. ▲

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us.msi.com

Yeah, we know you have blogs to post, video to encode, reports to write, and code to compile. We do, too, but you have to take a break once in a while (and maybe blow some stuff up). That's why each month we give you the lowdown on what to expect from the latest interesting PC and console games.

CPU Game Of The Month

FINAL FANTASY XIII

Your New Lucky Number

– *by Chris Trumble*

It's pretty tough to name a videogame franchise that has been around as long and been as consistently excellent as Square Enix's Final Fantasy series. Simply put, the FF games have provided genre- and console-defining moments since way back in 1990 with the release of the first FF game in the United States on the NES. Final Fantasy XIII is the first non-MMO game for the Xbox 360 and the first FF game of any kind for the PS3, and it marks some pretty major changes to the series' formula.

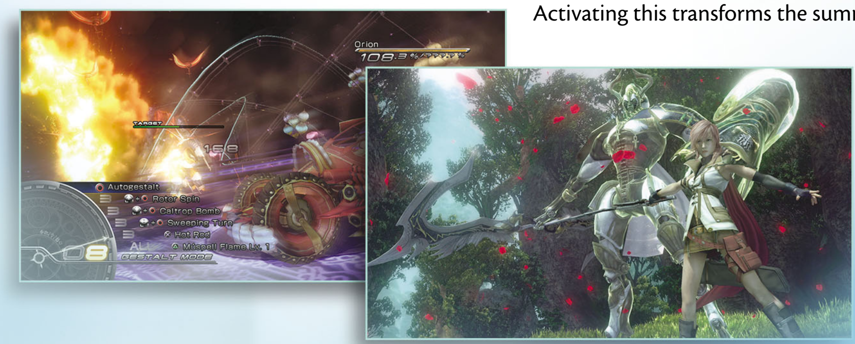
The first and most readily apparent development is how the game looks. Within seconds after startup, you'll know for sure that this game was designed for high-def, and Square took full advantage of the current consoles' beefier graphics power. The PS3 version edges the Xbox 360 version in the graphics department, but the Xbox owners need not worry; these are simply varying degrees of awesomeness.

Other welcome advances include some well-executed combat system tweaks; the series' Active Time Battle system now gives you more flexibility in your approach to fighting different kinds of battles (including an Easy button of sorts that provides a shortcut to a queue of optimal commands). This helps to keep combat fresh, which is all the more important given another change that we'll address in a moment.

The ATB gauge now has multiple slots, and you can fill them with attacks of differing types as dictated by your situation. Your characters can play specific roles in combat, such as Commando, Medic, and others. Developing these roles takes the place of traditional character leveling, and they define what sorts of actions each character will take by default during combat. You can create "paradigms," or sets of character roles, that you can change on the fly during battle as the need arises. For example, you might be inclined to use a simple paradigm where all your peeps are set for all-out attack until one or more of them have suffered grave damage, at which point you can switch to another paradigm where one heals and one runs defense for his or her comrades. Once your characters are patched up, you can seamlessly switch once again to a more aggressive paradigm.

Eidolon summons have been a staple of FF games for a long time, and they're present and accounted for in XIII, in both their traditional form and in the new Gestalt mode. Activating this transforms the summoned being into the form of a vehicle or mount, which the summoner then rides until the effect subsides.

All of these things, plus what is certainly the most accessible Final Fantasy story yet, combine to make this game incredibly good. The only negative we could find is that Square Enix chose to focus on driving the story to the exclusion of the hours of metagames and expansive exploration component present in many earlier FF titles. XIII is vastly more linear in nature than previous installments, and depending on your taste and point of view, this may be a great move or a deal-breaker. In either case, it's fair to say FFXIII is a different experience—one that we heartily recommend. ▲



$59.99 (X360, PS3)
ESRB: (T)een
Square Enix
www.finalfantasy13game.com

HEAVY RAIN

Search For The Origami Killer – *by Dr. Malaprop*

How many games have you played that evoke actual emotional responses? Heavy Rain tries something different and wants your emotions triggered as it transitions you back and forth between four characters. Ethan Mars, the primary protagonist, is the father of two sons, one killed in a car accident and the other now missing. Scott Shelby is a PI hunting down a serial killer, Norman Jayden is an FBI profiler working with the local cops, and Madison Paige is a photojournalist with insomnia. All are out to stop a serial killer that murders children and leaves them with an orchid and origami.

Gameplay is presented in full or split screen to convey the story. Animation and environments vary significantly and are laden with detail. Character movement feels awkward, but you'll likely get used to it. The game combines QTEs (quick-time events) similar to Dragon's Lair. QTE decisions are rarely black and white and are context-sensitive to situations. As your character's stress level increases, so do the word choices swirling around your character in 3D. Outcomes of your choices do not end the game, and the story will continue even if key characters die.

The game controller is used to force players to mimic in-game actions (such as climbing a muddy hill, fighting an assailant, and climbing through electric wires). These QTEs are effective in making you physically feel what the character is going through, which plays out amazingly in the game's action sequences. Each player is likely to have significantly different experiences even if the core plotline marches toward a multi-ending conclusion. Heavy Rain succeeds in its originality and in making you care about the story and characters. It's well worth playing. ▲

$59.99 (PS3)
ESRB: (M)ature
Sony Computer Entertainment
heavyrainps3.com

More Hijinks For The Dog & Rabbit Show

– *by Dr. Malaprop*

Season Two, subtitled Beyond Time And Space, originally debuted on Steam in 2008, hit XBLA late last year, and now bows on the Wii. As fans of Season One and with Season Three (The Devil's Playhouse) incoming, we used the Wii release as an excuse to warm up for the next version—and ended up going back to the XBLA and PC versions to make some comparisons.

The deranged dog and rabbit duo get up to their usual off-kilter hilarity in the five episodes that cumulatively make up the overarching storyline in this point-and-click adventure game. The PC and Xbox version looks best, with the Wii's visuals lagging behind and the game just not playing as nicely as it does on the PC and Xbox. Season Two is worth enjoying, but do it on a PC. Your next choice should be the Xbox, with the Wii a distant third. ▲

$19.99 (Wii, X360 XBLA, PC) • ESRB: (T)een • Atari
atari.com/games/sam_and_max2 (Wii, PC) • xbox.com/en-US/games/s/sammaxbtxbla (X360)

BATTLEFIELD
BAD COMPANY 2

Back For Another Tour Of Duty – *by Dr. Malaprop*

In Bad Company 2, you once again take up the role of Private Preston Marlowe of Bravo Squad. You and your cohorts (Sarge, Haggard, and Sweetwater) are ordered by General Braidwood to extract a super-weapon known as Project Aurora, developed toward the end of WWII, before the bad guys can get their hands on it.

This story is more serious than the original and does a better job of fleshing out your squad mates. These guys have full-fledged conversations, and it's enjoyable having them along for the ride. Like Modern Warfare 2, the single-player campaign is linear and leads you from one waypoint to another. You'll collect weapons and fight through a variety of set pieces that are enjoyable but don't live up to the impact of those in Modern Warfare 2. The big difference is the level of destruction you can inflict on structures. You can destroy walls to uncover enemies or even entire buildings to take out groups.

The campaign takes about eight hours and, unfortunately, does not feature a co-op mode or anything on par to MW2's Spec Ops. However, you'll get ample value in the completive online multiplayer, which is not surprising considering the Battlefield series' legendary rep for multiplayer prowess. There are eight maps, four game types, and multiple roles affecting how you'll play in those maps. Vehicles and aircraft are a bonus. The destructibility of the environments alters the combat feel (less twitchy and more strategic), which many may prefer to MW2. The PC version looks best, but we enjoyed the ease of Xbox Live. ▲

$59.95 (X360, PS3); $49.95 (PC)
ESRB: (M)ature
Electronic Arts
battlefieldbadcompany2.com

GOD OF WAR III

$59.95 (PS3) • ESRB: (M)ature
Sony Computer Entertainment
godofwar.com

A Fitting Conclusion – *by Dr. Malaprop*

The game opens in the chaos where God Of War II ended. Kratos and his Titans are scaling the heights of Mount Olympus to kill Zeus while fighting off the gods. For those of you who haven't played the first two games, you'll still enjoy God Of War III, but check out our reviews of The God Of War Collection in the February 2010 issue of CPU when you can.

God Of War III is very similar to its predecessors in both concept and gameplay. Those familiar with the series will already know exactly what to expect when playing as Kratos. The developers smartly opted to stick with what worked so well before. Kratos is angrier than ever and looks it with his hard sneer and savage, single-minded bent. Many of the battles are epic on a scale heretofore unseen in a console game, as when Kratos carries out your combos while the camera zooms out hundreds of feet to show the full size of your opponent. It's breathtaking. Our only real complaint is around some of the camera angles, which led to our demise enough times to be annoying—but not annoying enough to walk away.

This is the first native PS3 God Of War game, and many in-game scenes look on par with a CG film. Playing God Of War III is an exciting, action-packed experience to the climax, with some of the best graphics we've seen in a console game. If its predecessors weren't your bag, then you'll want to stay clear. For everyone else, it's a PS3 must-play and a fitting end to the Kratos trilogy. ▲

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AMD Athlon™ II	
635 CPU	$ 655
630 CPU	$ 635

X6 Six-Core Processor

AMD Phenom™ II	
1090T CPU (Black Edition)	$ 859
1055T CPU	$ 745

X2 Dual-Core Processor

AMD Athlon™ II	
250 CPU	$ 589
240 CPU	$ 575

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The Cutting Edge

by Barry Brenesal

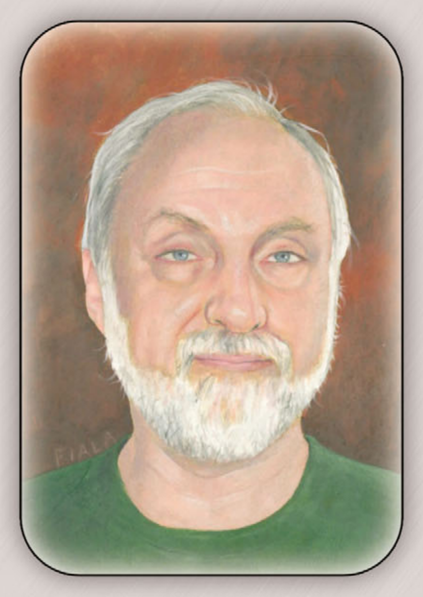
The Fall Of VisiCalc

Last month we looked at Software Arts' best-selling spreadsheet, VisiCalc, as it became the first general-use computer application and literally an overnight success. With apologies for the cliché, however, trouble was on the horizon. Problems started when the board of directors for VisiCorp (VisiCalc's publisher, originally called Personal Software) insisted the company needed a new, aggressive president. Terry Opdendyk was brought in, formerly of Intel, with the latter's combative culture and his own penchant for unilateral decision-making. Opdendyk reasoned that instead of focusing on marketing, VisiCorp should concentrate on internal software development.

Hindsight is a game that everyone wins, but there are a couple of elements here that should have given VisiCorp's board pause. Moving from a cooperative management style to an autocratic one was bound to cause some upheaval in one of the largest software corporations at the time. Switching from one major corporate goal to another was equally problematic. When these occurred simultaneously, it was no wonder VisiCorp experienced what the press called a corporate civil war and an exodus of valuable talent.

Among these was Mitch Kapor, VisiCorp's head of development. Kapor had repeatedly stated the need to develop an integrated spreadsheet and graphing program. Where others thought it important to get a no-compete clause in a contract with Kapor so he couldn't work on this, Opdendyk turned them down and is said to have famously replied, "He's a spaghetti programmer." Kapor subsequently left, co-founded the Lotus Development Corporation, and turned his skills to the design of Lotus 1-2-3. In short order, this spaghetti program surpassed VisiCalc as the best-selling spreadsheet. Lotus' business plan called for $1 million in sales its first year, when in fact it sold $53 million. That figure tripled the following year.

If letting Kapor leave in this fashion constituted a tremendous tactical error, VisiCorp's single-minded support for Visi On could be considered its strategic equal. In theory, the PC needed a graphical interface as soon as IBM released the computer, and VisiCorp's pet project of 1981 was prescient in such features as its support for multiple windows and its mix of bit-mapped text and graphics. Yet when Visi On appeared in December 1983, it came with a hefty, full-system price tag of $1,765. It also required 2.2MB of hard drive space, which meant buying at least a 5MB hard drive, bringing the total cost including controller to around $7,500 per unit. At roughly the same time, the Macintosh was released and was much cheaper and faster, if short on software, and Bill Gates announced that Windows 1.0 would be available in May 1984. In fact, it wouldn't launch until the end of 1985 (ironic, given that a Microsoft executive coined the term "vaporware" to refer to Visi On's delayed release of a few months), but Gates' promise of a product priced at a fraction of VisiCorp's had to further dampen Visi On's sales.



Barry Brenesal has written more than 1,000 published articles and reviews on electronic technology since 1987. His first personal computer was a Radio Shack TRS-80 model 100. It was last seen functioning as a boat anchor.

The final, largest mistake came in autumn 1983, when VisiCorp filed a $60 million suit against Software Arts, charging late delivery on VisiCalc Advanced. Under Opdendyk's predecessor, Dan Fylstra, Software Arts and VisiCorp had enjoyed a close relationship maintained at the highest level. This had been allowed to devolve to lower-level management, but the reasons for the bizarre suit have never been made clear. In any case, the result was a countersuit and a rout. VisiCorp was denied its requested injunction against Software Arts in 1984, and a settlement reached privately later that year ended with the latter as clear winner. The suits were dropped, the royalties VisiCorp had withheld from Software Arts paid, and the VisiCalc trademark left to the developers. But Software Arts lost, as well. According to Bricklin years later, his company was in secret talks at the time for acquisition by another company; these naturally ceased once the suit began.

With Visi On failing, VisiCorp and Software Arts attacking one another, and a brilliant new spreadsheet on the market, it wasn't long before both companies sank. VisiCalc, however, remains a milestone in PC development; the first software that caught the public's fancy and made it think about buying one of those newfangled personal computers. ▲

Wax nostalgic with Barry at barry@cpumag.com

Scammers' Paradise

Cyber Cons Become Big Business

Received any email lately from a hit man working for the "Ishmael Ghost Islamic Group" threatening your life? Did an antivirus program you never installed suddenly lock up your system, reporting that it needs to scan your PC to eliminate infections? Or has someone sounding a lot like President Barack Obama called to direct you to a special Web site in order to claim "government stimulus money?" (By the way, don't heed the call. The site will try to install Trojan software on your system.)

These were just a few of the new cons and malicious tricks that cybercriminals added to their portfolio last year. Cybercrime is definitely on the rise. In 2009, more than $559 million were reported lost to digital fraud at the IC3 (Internet Crime Complaint Center), a joint operation of the FBI and the National White Collar Crime Center.

"I think the general volume is just going up," says Jon L. Praed, founding partner of the Internet Law Group (www.i-lawgroup.com), which uses the courts to pursue scam artists and the many online service providers who aid and abet them. "As you see new types of mass communication developing on the Internet, whether it's blogs or comment sections, social networks or virtual world environments, or traditional email spam, all the numbers are getting worse."

Indeed. The IC3 says the monetary loss to online fraud last year more than doubled from 2008. The actual number of complaints registered with the organization went from 275,284 in 2008 to 336,655. In fact, the most commonly reported online scam last year (16% of all complaints) involved a phony email from the FBI itself that criminals used to extract personal information from the victim. The second most common form of Internet fraud involved fake items that people ordered but never received.

Internet Crime Reports Received, 2005 to 2009

Year	Complaints	Dollar Loss (million)
2009	336,655	$559.7
2008	275,284	$265
2007	206,884	$239.09
2006	207,492	$198.44
2005	231,493	$183.12

SOURCE: INTERNET CRIME COMPLAINT CENTER

A Maturing Scam Industry

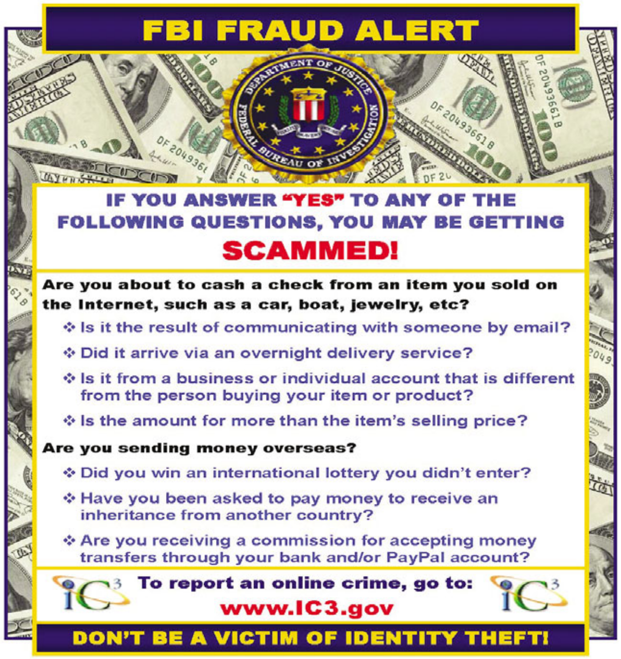
But who are these new-age con men, and how are they making money on sometimes laughably transparent fake pleas from Nigerian government officials to "send money now"? Actually, the explosion in Internet criminality really started in the mid-2000s, when email scammers met up with virus writers to start building an underground Internet economy that leverages Web technology with a kind of evil brilliance. The first generations of email spammers were being tracked and shut down by ISPs that could locate and block the originating IP addresses.

According to Matthew Prince, co-creator of spam-fighting group Project Honey Pot, an arms race ensued between spam blockers and mass emailers. But some of these shady marketers soon discovered that they could make easy profits off of emails offering fake pharmaceuticals or meaningless college degrees, for example.

"Spam migrated from gray to pretty black," he says. Spam became scam because "it is incredibly profitable. You can send messages for such low cost." If a scammer sends millions of messages advertising phony drugs, "then less than a thousandth of a percent of people have to buy that product for it to be very profitable," says Prince.

But as ISPs and antivirus software became more sophisticated in blocking known spam scams in the early 2000s, criminals needed a new way to get connections to the Internet. Enter the virus kings.

"Spam was the business model for the original virus writers," says Prince. Spam scams created a market need for legitimate connections to the Internet, and viruses could be used to infect individual PCs and use them as proxies for sending out fraudulent emails. An underground economy emerged in which virus writers created botnets of compromised PCs. They then leased these bot networks out to cybercriminals for as little as $15 per minute of use. Although this sounds like an exorbitant rate, in a matter of mere minutes, millions of emails could be sent that thwarted the usual IP blocking techniques.



FBI FRAUD ALERT

IF YOU ANSWER "YES" TO ANY OF THE FOLLOWING QUESTIONS, YOU MAY BE GETTING SCAMMED!

Are you about to cash a check from an item you sold on the Internet, such as a car, boat, jewelry, etc?

- ❖ Is it the result of communicating with someone by email?
- ❖ Did it arrive via an overnight delivery service?
- ❖ Is it from a business or individual account that is different from the person buying your item or product?
- ❖ Is the amount for more than the item's selling price?

Are you sending money overseas?

- ❖ Did you win an international lottery you didn't enter?
- ❖ Have you been asked to pay money to receive an inheritance from another country?
- ❖ Are you receiving a commission for accepting money transfers through your bank and/or PayPal account?

To report an online crime, go to: www.IC3.gov

DON'T BE A VICTIM OF IDENTITY THEFT!

In 2009, the FBI aggressively warned consumers about online scams, but scammers themselves also relied on the FBI. Phony FBI messages were among the most common form of email trickery seen last year.

Prince's Project Honey Pot tries to find these botnets by planting traceable email addresses on pages that these bad actors are likely to scrape for new prospects. Although it's hard to know exactly how many PCs are surreptitiously enlisted in these bot armies, Prince says, "on any given day, we see that there are 10 million machines . . . online doing something actively negative."

Several bot armies are controlled and leased out by mob-like gangs whose primary use is to send spam that scammers can exploit. The online underground today has evolved into a sophisticated assembly line. Some elements in the chain specialize in harvesting emails. Others are known for writing effective spam campaigns. And some are specialists with deploying and leasing bot networks.

"You are seeing a diversified, vertically segmented market in the underworld," says Praed. "The bad guys are highly skilled and specialized. That is a sign of a mature business environment. That's a very dangerous thing for us."

Organized Cybercrime

What do these cybercriminals want? Well, money, obviously, but they use a variety of means to get there. The scammers actually use "A-B testing" of different messages to see which ones get the best response. Among the most prevalent operations now are fake drug scams that involve sending physical (often ineffective) merchandise to people because all businesses, even shady ones, love return customers. "We have interviewed spammers who say there are an unfathomable number of customers who reorder the bottle," says Prince.

Generally, the scam artists are trying to extract as much information from you to bundle and reuse elsewhere. Whether it is a bank account or a credit card number or even just your Facebook login (through which they can send scam offers to your friends), the cybercriminals will take whatever they can get from you. "You can buy identities from underground organizations, and largely they come from phishing schemes," says Cory Siddens, senior product manager, CyberSource, which helps ecommerce companies prevent fake ordering using stolen identities. Fraud rings harvest names and passwords and use them to place orders for scores of high-priced items they can resell. Merchants have gotten savvy about verifying credit card orders with IP geolocation and billing address checks, but the criminals often use automated ordering systems that overwhelm the safeguards. They also use botnets to thwart verification. "We are starting to see 'perfect fraud' where they are faking an IP address from the point of origin of the card," says Siddens. And to avoid detection of their own address, these same rings use "work at home" schemes where innocent people are enlisted to receive these orders and reship them to the fraud rings. "Some grandma gets a package and sends it off to France, and she thinks it is legitimate," he says.

The New Face Of Cybercrime

In the last few years, online crime has gone international and social. "They can be anywhere," says Siddens. "A bunch are in Eastern Europe. There are a lot of people with technical skills and a solid engineering background." According to the latest IC3 figures, the United States remains the greatest source of perpetrators, followed by the UK, but gangs are also prevalent in areas of Africa, the Pacific Rim, and anywhere someone can get an Internet connection. Some of those infamous calls for cash from officials in Nigeria are actually coming from Nigeria, says Prince. "It's someone in an Internet café sending those messages out."

But the big trend in cybercrime lately is penetrating social networks where people deliberately reveal information about themselves and maintain networks of many others that can be exploited. As ISPs and security software have closed down easier points of entry, the arms race continues, and criminals look for other weak links. Given the complex economy of Internet fraud, criminals are not just after money but just as often after resources that they can monetize in other ways. If a false message from someone you know gets you to log on to a site

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with your Facebook username and password, you or your antivirus software may be smart enough not to download the Trojan software that would give criminals control of your system, but our thief has already captured your Facebook login. With that, he has access to a list of friends who can also be spammed with phony Facebook messages, and that list can be passed on to other thieves. With most onliners now on guard against the obvious ploys from banks and people they've never heard of, the criminals now look for any way to engender trust.

And that is the big challenge for technology, law enforcement, and users. Maintaining frequently updated security suites across email and browser is *de rigueur*, of course. But the virus and scam partnership is engaged in a constant game of real-time cat and mouse in which new intrusions are developed quickly to thwart this morning's antivirus profiles. Project Honey Pot maintains a database of suspicious and known IP addresses that users can consult. Some, like Praed, believe we need to go after the often legitimate Internet infrastructure that enables these scammers (see sidebar). But as the criminals start hijacking not only our identities but also those of our friends, the bar has been raised high on the need for personal vigilance and, alas, suspicion.

"At the core of the scam is 'whom do I trust?'" says Prince. By harvesting social media and being able to hijack specific PCs to make personal appeals and recommendations to friends, the new class of cybercriminal isn't just posing as a Nigerian state official anymore. "The bad guys can have the ability to assume the identity of anyone they want," says Prince. ▲

by Steve Smith

"The Bad Guys Often Are Among Us"

It isn't just the con men and frauds that are the problem in an online world of interdependent technologies, says Jon L. Praed, founding partner of a law firm dedicated solely to battling these cases, the Internet Law Group (www.i-lawgroup.com). Every con needs an email server and a domain name provider. Every fraudulent drug salesman needs a legitimate credit card processing partner. The lawyer who helped AOL and Verizon win landmark cases against scammers and spammers tells us that in the world of Web crime, you need to go after the infrastructure on which the bad actors rely.

CPU: You say that the problem is not just criminals but the fact that they need fully legal technologies and services to perpetrate their crimes.

JP: The problem in my view is that the bad guys often are among us. Technology allows us to see who is selling domain names that repeatedly appear in fraudulent Web sites. What are the registrars doing? The DNS hosts that are providing connectivity? Are there ISPs with compromised machines in their networks? Corporate entities have to do due diligence. You take that universe of enablers and ask what legal systems do we have in place that create a race to the top rather than a race to the bottom—systems that encourage enablers that are involved to clean themselves up. How can the system focus on those who are knowingly enabling and profiting from their acts of enablement?

CPU: You have in-house technology designed to identify the companies that enable the scam underworld. How does it work?

JP: We receive reports from the public at ReportPhish.org, where people can register and report phishing emails and other types of fraudulent Web sites (spam-vertising, malware, etc.). Our tool spiders the Web pages and captures the technical data. We put it all in a database and then do analysis on the data to identify the enablers behind the Web footprint. We do analysis on the data to identify critical enablers who appear in more than their fair share of the activity. We then engage the enablers in legal "conversations"—sending them cease and desist letters or subpoenas or even suing them if that's the only way to address the problem. By engaging uncooperative enablers, we are able to obtain real identity on the ultimate bad guys who are hurting us all.

CPU: Give us an example of how this kind of digital detective work led you to the culprit.

JP: We represented a large ISP in a lawsuit against adult Web sites that were paying affiliates to drive traffic to their sites through spam. All the spam was leading through tens of thousands of throwaway [temporary] Web pages that led to the permanent adult Web sites. We filed a John Doe suit and subpoenaed the enabling companies involved. We saw 1,200 Web sites owned by hundreds of separate entities, but 50 of them had 95% of the activity. The most frequently appearing was Cyber Entertainment Network, owned by two guys in Florida. We sued them for enabling spam and won a substantial settlement.

CPU: Are these various hosts, domain name providers, etc., aware that they are being used for illegal purposes?

JP: There are enablers that do and don't have knowledge. Online it is not clear that enablers of fraud are being negligent and can be held legally accountable. We need to sort them appropriately and create systems that encourage this self-sorting. We don't have a slate of law enforcement tools. The standards are there, but they haven't been applied.

Software Tips & Projects

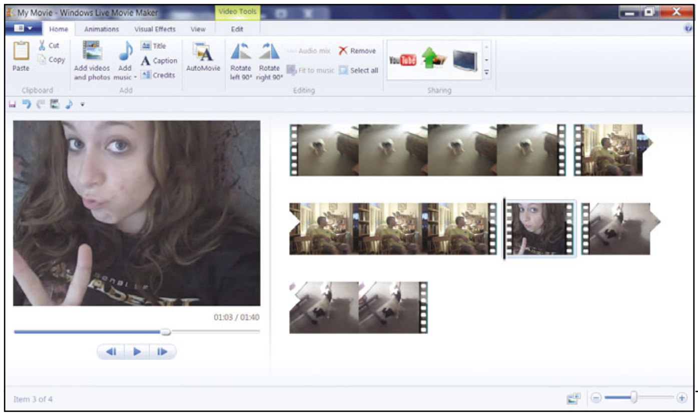
Movie Maker Lives . . . Again

Along with Windows 7, Microsoft has also launched a new set of productivity and multimedia applications in its Windows Live Essentials series that includes a new email client, photo gallery, and video editor. The Windows Movie Maker program has been with us for a while and through several iterations, but the new Windows Live Movie Maker version is substantially improved and gives multimedia makers all they really need to edit and enhance their video for most home use and online sharing. You can get the new program at download.live.com either as a standalone download or part of the entire Live Essentials package. Last month, we made a quick DVD with the perennially overlooked DVD Maker app. This month, we uncover some capabilities of Movie Maker that reveal a program that's more advanced than you may think. Keep in mind that MM is not exclusive to Win7. It runs on Windows XP SP2 or Vista, as well.

Hyper-Customize It

The new Live MM has the same Ribbon and Quick Access interface as other Win7 tools, such as Paint and WordPad. If you haven't seen it before, look for the Quick Access Toolbar in the upper-left corner of the MM window. Mouse over the first icons, and you will see that they are shortcuts to Save, Undo, and Redo. You can expand these shortcuts by clicking on the downward-facing arrow to the right and checking other commands.

This is where MM becomes truly personalized. You can also radically customize Quick Access. When you right-click most commands throughout MM, you have the option to add the function to the Quick Access Toolbar. In effect, you can create a console of your most-used tools and circumvent the cumbersome Ribbon interface altogether. For instance, click the Visual Effects tab to bring up the first row of effects you can apply to a clip. Right-click any of the choices, and you will see the option to "Add Gallery To Quick Launch Toolbar," which will save you several clicks by putting this sub-menu of choices in the top-line menu. The same option is available on most of the major adjustment commands.



The new Windows Live Movie Maker lets you trim the start and stop points for individual clips by dragging the new editing bar in the redesigned timeline.

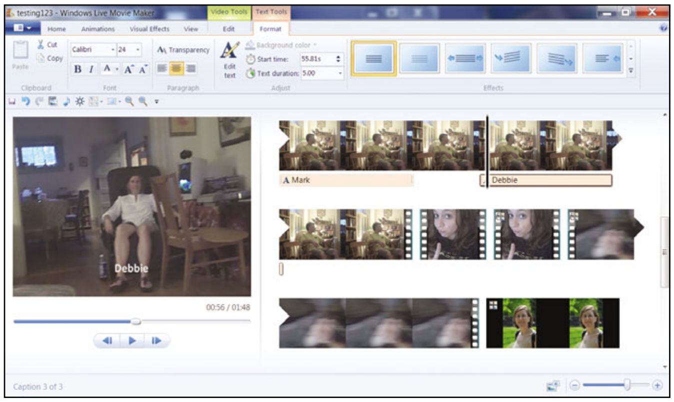
Why bother ratcheting through the Ribbon when your most frequently used commands can sit on the top-line menu? You can also use the menu to show the Toolbar below the Ribbon. Right-click the top menu of the window and select Minimize The Ribbon. This will leave only your custom Quick Access Toolbar.

Tweak Your Transition

Once you have pulled multiple clips into MM (via the Add Videos And Photos command), you will see that the editing interface has changed considerably. Rather than the typical timeline of clips along the bottom, you'll see a large pile of clips divided into thumbnails running left to right on the right half of the screen. Get used to using the plus (+) and minus (-) keys, which zoom your view of this new timeline in and out. As you zoom in, each clip gets longer and with more thumbnails. This helps the MM locate more precisely the right spot in a video to make a splice. We won't go through the basics of setting start and end points or splitting a clip. Instead, here are a few cool things that are less self-explanatory.

The Animations menu lets you apply a cool transition effect between two clips. Highlight the clip, and then in the Animations menu, mouse over each of the many wipes, fades, and digitization effects to preview the way each will look between your clips. Once you choose one, a Duration drop-down box lets you set the time it takes for the transition to complete. The actual drop-down box only gives you a limited range, but if you click within the Duration box itself, you can enter any value to make a transition that lasts much longer.

You can also combine splicing with one of the handiest tools in MM, the Brightness control. Yes, you can lighten your video footage pretty effectively, and there is an easy way to apply it just to select



Start time: 55.81s
Text duration: 5.00

A neat trick in MM is to insert captions that pop up and identify items and people in your video as it progresses.

lengths of the clip. If you have a long clip that is poorly exposed in just one area, load it into the project and find the point where the brightness level changes. Use the manual bar to find the spot and then the frame-by-frame advance (*J*) or rewind (*L*) keys to get just the right frame. Now, use the Split command. Highlight the new clip that needs modification. In the Visual Effects menu, find the Brightness button on the far right. Use the slider to adjust the brightness up or down. The Brightness effect applies to the full length of whatever clip is highlighted, so you need to use this Split trick to isolate one section for adjustment. Remember that MM does not put any transition between clips. If you don't apply your own transition between two clips, then they simply go from the last frame of one to the first frame of another and look to the viewer as if they are the same clip.

Name Anything

Many people may be tempted to use the Captioning feature merely as a way to label or title the opening of a clip, but you can actually superimpose text on your clip wherever and whenever you want. For instance, you can use captioning throughout a video clip to label the people, places, or events for posterity. Imagine a video of a family event where the camera pans across multiple people. You can have MM pop up names for each of them as they appear.

In the relevant clip, use the editing bar to locate where you want a label to appear during the sequence. In the Home menu, click Caption, which will push you over to the Format menu. Type the label into the text box in the preview window and position it as you like. Notice that you can also apply endless text formats and tricks to this caption, from font colors to on-screen text animations.

Keep in mind the duration of your captions. You want to make sure the caption only stays on-screen as long as the item being labeled. Use the Text Duration drop-down box to adjust this. Again, you can click within this box and enter any time (in seconds) you want.

Of course, you can also use the Caption feature to narrate a video with text. You can inject comments or story bridges, narrative, etc., directly onto the screen at any point in the video using these tools.

The Effects Multiplier

Furthermore, you can combine the effects found in the Visual Effects menu to create an even more singular appearance. Open the entire window of effects choices, and at the bottom, you will see "Multiple Effects." Click this to bring up a window that lets you add multiple effects to a single clip. For example, if you want something really trippy, combine Edge Detection with Posterize. The first effect reduces the video to its basic outlines (much like a coloring book). The second effect adds intense random colors to the mix. The two together make a startling effect.

Next month, we'll drill into some of the ways that video and still images can be combined and the way to use MM to craft a sophisticated slideshow. ▲

by Steve Smith

Windows Tip Of The Month

Tired of the same old Desktop background? Switch things up a bit by turning the Desktop into a slideshow of images. Right-click an empty area of the Desktop and call up the Personalize window. Click Desktop Background. You can choose the images for your background slideshow by holding down CTRL and clicking multiple images. Use the Browse button to find personal images from your Libraries folder if you like. When you've selected the images you want, use the Change Picture Every drop-down menu to set the timing.

Registry Tip Of The Month

Windows monitors your disk usage to warn you when it is about to get full. Some tweakers argue that the feature just uses system resources unnecessarily because most of us already know when we are nearing the disk full status. To disable the warning system, go to HKEY_CURRENT_USER\SOFTWARE\MICROSOFT\WINDOWS\CURRENTVERSION\POLICIES\EXPLORER and right-click to make a new DWORD (32-bit) named NoLowDiskSpaceChecks and set the Value data to "1."

Infinite Loop

Microsoft Office Word: The Game

The line between "utterly brilliant" and "horrifically stupid" has thinned to near imperceptibility with the introduction of Ribbon Hero, a bona fide video game that Microsoft itself created in order to school users in the Way of the Office. Score points (really) by showing your Word, Excel, and PowerPoint mastery and compare scores via Facebook to determine who is the one true Ribbon Hero. Office devs, if you're reading this, we have one thing to say: Mortal Kombat-Office Paper Clip mashup. Think about it.

Source: www.officelabs.com/ribbonhero

In Win IRONCLAD

www.inwin-style.com

If it isn't obvious from the name, the Ironclad case from In Win is designed with intensity in mind. The full-tower metal case is built for strength and intimidation; even its metallic paint job, available in an almost-black or dark gray finish, serves to both look severe and to protect the case from corrosion.

The case also offers size; not only is it a big fella on the outside, it has lots of space inside. It can handle any size motherboard, from microATX to Extended ATX.

Anticipating a bevy of components and accompanying clutter, the Ironclad has a cable management hole built in and a slew of fans and mesh openings to keep all that hard-working hardware cool. There's an ultra-silent 22cm LED fan on one side panel as well as three 12cm fans and a ventilated floor panel to ensure proper air intake and exhaust.

The Ironclad supports up to 10 12cm fans. The mesh air filters on the fans, as well as the one on the front bezel, are designed to keep out dust. Additionally, the power supply mount is on the bottom of the case with ventilation and an air filter to protect the PSU and preserve its life.

Even with all the fans, the Ironclad is designed to stay quiet with sound-absorbing materials inside the case.

The Ironclad features a steel structure and a patented shock-free railing system to protect ODDs and HDDs from harm, as well as to provide a convenient means of installing drive bays. It also has a rotatable stand. All told, the Ironclad sports five 5.25-inch and six 3.5-inch bays, with one extra 2.5-inch supporting tray.

Size and strength are only so compelling without the ability to customize a case; the Ironclad is optimized for expandability. The case features eight tool-free I/O expansion slots as well as an easy-to-access top port with USB, eSATA, IEEE 1394, and audio ports.

The Ironclad is a big, bad case with plenty of features for customization, expandability, and ease of use. ▲

advertisement

Warm Up To Penguins

Open-Source Corporate Communications

It's hard to survive on the Internet today without email, and there are lots of ways of sending and receiving it. Nowadays, when most people use email, they're generally using Web-based email clients. This offers a convenient and familiar interface for people who prefer firing off emails to simply tweeting. And although people also send text messages and do instant messaging, there are Web interfaces for that stuff, too. As such, online communication between individuals is either Web-based or at least accessible through a Web browser.

However, in a corporate environment, most companies prefer to keep internal email within the company's network. Businesses don't want to risk prying eyes watching their confidential information flow through the Internet at large. As a result, email in the workplace traditionally relies on a standalone mail client accessing email on a server. Instant messaging in the corporate environment also tends to be tied to a program rather than a Web page.

Certainly, there are Web-based communications options available for corporations. For example, Google offers Gmail, Google Docs, and Google Calendar for companies of all sizes. For companies/groups with fewer than 50 users, Google Apps Standard Edition is available free; a Premier Edition adds features, along with a price tag, for larger businesses (or those willing to pay for extra functionality). VMware's Zimbra is an open-source collaboration suite that's based on Web technologies.

Regardless of these alternatives, the vast majority of companies still prefer their internal communications to follow the conventional client/server approach. And the biggest player in the corporate communications environment is Microsoft Exchange. Exchange is designed for enterprise-level collaboration among employees. It provides common services for email, calendaring, contacts, and tasks.

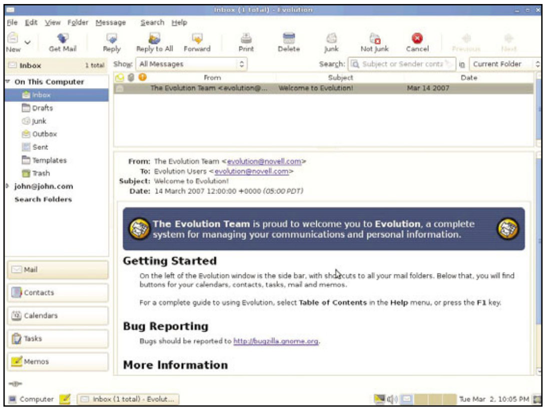
There are a couple of reasons why Web-based communications services aren't as widespread as the traditional approach. One reason is that Web-based communications tools require you to be online to access all of the content. Whether it's digging through emails for an old conversation or trying to strategize on a bid, you always have to be online to do your work. With a traditional approach, all users are on the same network, so there aren't connectivity issues. So that even if the company's connection to the Internet drops, all internal communications continue anyway.

Security is another reason that Web-based communications aren't as widespread in the corporate world. This isn't to say that the Web alternatives are insecure; they just may not be secure enough for some companies. Some companies require a level of security far above what most people are used to. In these types of companies, it's not unusual for everybody to have to change their passwords every few months. Additional measures such as smart card readers may be deployed throughout the company, too. That level of security is unlikely to be used or supported by third-party hosted Web-based collaboration software. And if you're a company that's going to be hosting the collaboration server, then the Web offers little advantage.

For those needing to use a standalone collaboration client environment, there are a handful of open-source options available. Although the selection may be small, that's only because the choices are quite powerful.

Evolution

For the longest time, the best free client available to use in a corporate environment was Evolution. Because Microsoft Exchange is the dominant collaboration server used in corporate environments, Linux clients have to conform to it. And when it came to free and open-source Linux clients, Evolution offered the most comprehensive level of integration with Exchange. Also, because Novell was the primary backer of the Evolution project for a while, Evolution also offers connectivity with Novell GroupWise. This ability to connect with multiple corporate environments is one of the reasons Evolution is so widespread as the default mail client on many Linux distributions.



From | Subject | Date
The Evolution Team <evolution@... | Welcome to Evolution! | Mar 14 2007

From: The Evolution Team <evolution@novell.com>
To: Evolution Users <evolution@novell.com>
Subject: Welcome to Evolution!
Date: 14 March 2007 12:00:00 +0000 *(05:00 PDT)*

The Evolution Team is proud to welcome you to **Evolution**, a complete system for managing your communications and personal information.

Getting Started

On the left of the Evolution window is the side bar, with shortcuts to all your mail folders. Below that, you will find buttons for your calendars, contacts, tasks, mail and memos.

For a complete guide to using Evolution, select **Table of Contents** in the **Help** menu, or press the **F1** key.

Bug Reporting

Bugs should be reported to http://bugzilla.gnome.org.

More Information

Evolution handles everything—email, contacts, and calendaring—*and* works with Microsoft Exchange.

In order to take full advantage of Evolution, an Exchange server must have

OWA (Outlook Web Access) installed. This isn't a tough requirement, as OWA is a free download from Microsoft and essentially provides a Webmail interface to Exchange. As a result of this convenience, lots of companies already install it so their remote users can stay connected.

But providing good connectivity with Exchange doesn't mean much if the application itself has issues. Evolution is a more than capable email, calendaring, and task tracking client. It gives you seamless access to Exchange servers so that you have most of the functionality that actual Microsoft Exchange clients would. It can even act as a USENET news reader, giving you access to online discussion forums. Toward the bottom left of every screen is a cluster of buttons that give you access to the program's other functions. There's no need to go digging around buried menus to go from email to calendaring.

Thunderbird

Lots of people have heard about Firefox, Mozilla's free Web browser. Mozilla's mail client, Thunderbird, is less well known. Part of the problem is that, for a long time, Thunderbird has been only a mail, news, and RSS client. It lacked calendaring capability and the ability to connect to corporate servers, such as Exchange. The newest version of Thunderbird brings a new user interface inspired by many different sources, and one of its noticeable shortcomings has been addressed.

One of the most significant user interface changes with Thunderbird is how it shows your email correspondence. While your accounts and folders are on the left-hand side, Thunderbird now defaults to a view of your mail known as Smart Folders. This is similar to how newer versions of Microsoft Outlook display your correspondence. Specifically, it shows all the stuff in all of your folders across all of your accounts; there's no longer a need to search the correspondence in each mail account individually.

Another change in Thunderbird's interface comes from Web browsers in the form of a tabbed interface. You can read the message in its own pane, but you can also double-click it, and it'll open up in its own tab. Thunderbird's tabbed approach offers the same benefits as tabbed browsing, eliminating window clutter and making your desktop cleaner.

The new version of Thunderbird also sports an improved search interface. Most mail clients show you matching emails, along with a little context, when you search for something. Thunderbird 3's new search feature shows you relevant matches in a graphical timeline, groups the matches by date and relevance, and lets you further filter the search results. This makes it extremely easy to find the particular email or conversation you were looking for.

A common complaint against Thunderbird was that it lacked any calendaring capability. The developers responded that that was never an intended function of their client and that the related Sunbird project—a free, standalone calendaring application client—could do the job. If you'd rather have calendaring built into Thunderbird's interface, however, Mozilla's Lightning is an add-on that does just that.

DavMail To The Rescue

Even if you use Thunderbird with the Lightning add-on, you still won't achieve the same level of connectivity as you would with Evolution. Evolution can work with Exchange and GroupWise servers, while Thunderbird still can't work with either server. But with a handy little open-source application called DavMail, you can bridge that gap with Exchange servers. Despite its name, DavMail does much more than handle mail with an Exchange server. What DavMail does is provide access to Microsoft Exchange services through standard protocols. It does this because Exchange uses its own proprietary protocols to work with other Microsoft products.

DavMail provides SMTP, POP3, and IMAP support for mail clients, LDAP support for looking up contacts, and CalDav support for calendaring. DavMail has the same requirement as Evolution, namely that the Exchange server must have OWA installed. So, you can use Thunderbird to handle corporate mail and contacts and add Lightning for the calendars. However, if Novell GroupWise access is essential, then DavMail won't be of much help.

There are a lot of options available for people in corporate environments. You're no longer limited to using Microsoft products in order to work with Exchange. ▲

by John Jung

Infinite Loop

Australia, Enemy Of The Internet

With its boomerangs, koala bears, and Crocodile Dundee, Australia hardly seems to exhibit the characteristics of a belligerent nation, so why does the Land Down Under suddenly find itself in the company of North Korea, Iran, China, and Cuba? A recent plan to censor Aussies' access to Web sites hosting a range of unsavory content has landed it on media rights group Reporters Without Borders' watch list. On the bright side, a little friendly content filtering is a lot better than being locked away in a Chinese prison.

Source: www.news.com.au/technology/australian-listed-on-media-watchdogs-internet-enemies-list-over-web-filter-plan/story-e6frfro0-1225839870235 by Mike Magee

Solid-State Drives Finally Become Affordable

Suddenly, it looks as if what was a dream for years is becoming a reality. OCZ launched a drive at less than $100 just a few weeks ago, and that was accompanied by a flurry of activity from other vendors interested in playing a major part in this burgeoning business.

The OCZ Onyx SATA 2.5-inch series includes a 32GB model that's less than $100. SSDs have a very big future.

Giants from the "traditional" market of electromechanical hard drives, such as Seagate and Western Digital, are piling in, too, meaning that pretty soon solid-state drives are going to be really affordable and a must-have for everyone. The Intel and Micron joint venture will contribute to the speed of SSD adoption.

Storage is considered by many to be a boring topic, but as everyone knows, there's nothing more frustrating than finding your closet is full and your latest designer creation has nowhere to live unless you chuck some of your old stuff out.

What's true for clothes is true for technology, too. As you can see from the photo by this column, I am really very, very ancient, and over the years have suffered all sorts of computer-related disasters. When I lost 20,000 words of a book I was writing, that taught me to assiduously back up all my important files. So, in the corner of my study there's a pile of hard drives, ranging from one 5.25-inch Maxtor drive to a pile of 3.5-inch hard drives. I got so obsessive about this that I also saved stuff onto 5.25-inch floppy drives and boxes and boxes of 3.5-inch floppies, too. No 8-inch floppies, though.

Some of the data I've got is for personal computers that no longer exist except in museums. There are serious attempts being made by academics to create archives of digital material for past, present, and future formats because there's a real danger that whole slabs of history could be lost to our descendants otherwise. The British Secret Service takes this so seriously that when it transferred its files to optical drives, years ago, it built a vault in the countryside and stored all its paper files there.

Mike Magee is an industry veteran. He cut his teeth on ancient products such as the Dragon and the Japanese PC platforms long before the IBM-PC won. He worked for a corporate reseller in the mid-'80s and saw the Compaq 386 sandwich box and every GUI known to humankind. Mike decided that the way to go was the Interweb around 1994 after editing PC mags in the late '80s and '90s. A co-founder of The Register, Mike started the chip-driven INQUIRER (www.theinquirer.net) in 2001. Mike recently started his own Web site, www.techeye.net. He continues to large it up for tgdaily.com, too.

Moore's Law never ends. Now the companies that make the NAND flash memory used in solid-state drives continue to shrink the size of the die on large wafers, relentlessly driving down the price of the chips and giving us ever more capacity to play with. And all the concerns that initially emerged about the number of times a drive could be written and rewritten seem to be mastered, with the vendors giving mean time before failure figures for SSDs that match electromechanical drives.

There are also ranges of SSDs aimed at the commercial marketplace, for data centers and the like. A large company is not going to rely on a drive that's not robust enough to hold corporate data.

What will this mean for the rest of us? It means lightning-fast boot times, lighter and faster notebooks, and the promise of ever larger solid-state capacities. It also makes for longer battery life for your notebook because there's no constant whirring with silicon memory. When the economies of scale and competition start to really kick in, who would not want an SSD in their notebook or their desktop?

It's all come such a long way from my very first ever x86 personal computer; you booted that from a floppy drive and stored your data on another floppy drive. It had a remarkably inferior screen, practically no expansion ability, and only a tiny amount of DRAM onboard. I had to save up to buy my first hard drive, a Western Digital. It cost a fortune and supplied what I then thought was an astonishing 32MB of storage. But then I was running DOS. Microsoft has made sure that the CPU, storage, and memory have to be big enough to deal with the now very beefy Windows operating systems.

The OCZ Onyx is only 32GB, but it's obvious that we're going to see larger-capacity drives from the manufacturers, and at ever more affordable prices. ▲

Send rumours to "Mad Mike" Magee at mike@cpumag.com

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Technically Speaking

An Interview With Metadot's Daniel Guermeur

Daniel Guermeur is founder, president, and CEO of Austin-based Metadot. He is a French entrepreneur who in his spare time writes Java Web applets on Das Keyboard.

by Barry Brenesal

CPU: Was Das Keyboard Metadot's first product?

Guermeur: It was an accidental product. We are a software company [that] started in 2000. As a software programmer, I spend most of my day typing on a computer, and I realized I was really, really slow—compared to what I could do if I wasn't looking at the keys all the time. So I decided to try and improve my typing by getting a keyboard that was blank. When I couldn't find anything, I asked my assistant if she knew of anything like this, but she said there was nothing on the market. We ended up asking a supplier in China to make just one for me.

I got that keyboard and used it for a few weeks, after which my typing speed improved. The first week was terrible, because you can't type on a blank keyboard if you aren't used to one. But then one morning you get up, and you can remember where the keys are. You can touch type! It works just like that.

CPU: This sounds a bit like the immersion theory of learning a new language, where you're forced into a situation where you have to quickly acquire a new skill to communicate.

Guermeur: Yes, it's like that in many ways. You know, the beauty of that kind of learning process is that, even if you don't work actively at it, you still learn. Because your brain does the work automatically, you don't consciously.

When I was 23, in France, I was accepted as an exchange student to Stanford University. It took three months before I could understand English well, and it happened overnight. It's not a matter of tiny improvements each day, but huge increments that happen suddenly. Same thing with typing.

CPU: Das Keyboard is known primarily for two things. One is the blank keyboard, but the other is its clickability. What led you down that path? There are many people who would say that the modern, click-less keyboard was a great development and that this seems to be a regression to earlier days.

Guermeur: The way people become efficient while typing isn't by just using their fingers. You also use your ears. When you hear an audible click, your brain knows that a key has been pressed and it's time to go to the next key. This increases your accuracy. You press less hard on the keys, and not for as long, because you have this extra feedback going on. The clicks also become a sort of rhythm; when I type my name, it is always one rhythm. I can increase speed based on knowing and hearing that rhythm, too. That always helps me type a little faster.

CPU: So what you're offering isn't just nostalgia for old Remington typewriters. It's a method of feedback that improves typing efficiency.

Guermeur: Absolutely. It's audible and tactile feedback. You also need a keyboard that is easy on the fingers. People who spend eight hours a day—or more, like me—on the computer, must have a keyboard that is very comfortable. We've heard from many people who complained about pain in their fingers and wrists and switched to mechanical keyboards, whether ours or others. That audible feedback helps them stop pressing down all the way, and it's much easier on the hands.

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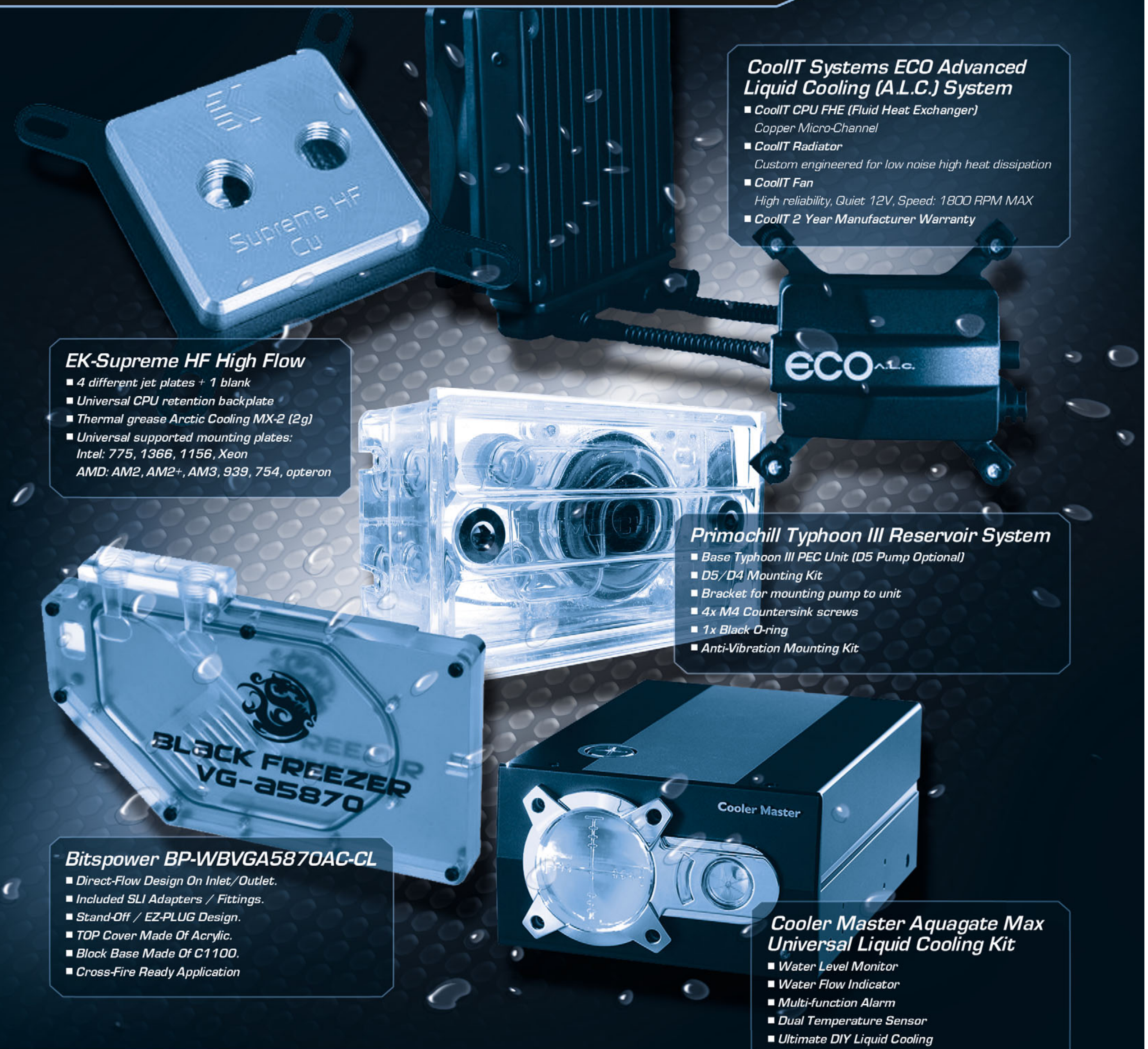

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CPU: Returning to where we started out: You developed a keyboard for yourself. When did you conclude that it truly had a market?

Guermeur: I'd used my keyboard for about a year. My friends and colleagues who entered my office at that time would look at the blank keyboard, then at me, and say, "You must be really good." And I'd reply, "Yes!" So there was a bragging dimension to it, besides the fact that I was able to type faster.

Then our accountant came to me and said, "I'd like to buy a similar keyboard for my husband, because he doesn't type fast." I replied that I had so many demands and asked her to please wait a bit, that we'd sell it on our Web site. That was the tipping point: someone's relative who was not a geek that enjoys showing off like I do and doesn't enjoy fancy gadgets or the noise of typing.

CPU: How did you manage to market Das Keyboard? It's not, after all, a necessity, real or perceived, and it's not a standard luxury good.

Guermeur: As a software company, we took a long time before we decided to sell it, despite obvious interest from friends and colleagues. I asked, "If I sold this, would you buy it?" They all agreed, so I suggested we go to a place where there are tons of people who type all day long. We visited a data center in San Antonio, and said, "Here's a prototype we'd like to show to your people. Perhaps they can give us some feedback." There were approximately 20 professional system managers who came to test the blank keyboards. Then they answered a few questions, one of which was whether they'd buy the keyboard. Sixty percent of them said yes.

We thought this was great and that, clearly, people liked it. But we said to ourselves, "We don't have any manufacturing plants. All we have is a few blank keyboards. Before we go ahead with this, let's see if there's real demand. This isn't going to be cheap. It's a niche market of very limited quantities. So let's do a Web site with a nice picture of our keyboard and a Buy button with an $89 street price." Then we sent an email to the gadget blog, Gizmodo, hoping the publisher might say something that would get us some traffic. We figured we'd receive five, maybe 10 orders. They put up a picture of our blank keyboard, and after five days, we received 1 million hits on our Web site. It was picked up by Slashdot and by *The New York Times*, both the printed and online versions. Every day, our server crashed.

We got thousands of orders, and we were not prepared. The only thing we had going at the time was our Web site, the one with the picture and the Buy button. So we contacted our buyers, and told them, "We're sorry, but we're out of stock now. If you can wait two to three months, we'll ship to you." The vast majority said they would wait. Then we scrambled to procure the keyboards, shipped them, and that's how we got started in this.

CPU: Have you shown it since at any conventions, where electronic-savvy folks tend to gather?

Guermeur: No, we've not done a lot of marketing up until now. We are just doing that for the first time at South By Southwest.

CPU: I wondered about that, because there's a general perception that peripherals are cheaply made things unworthy of much attention. You would disagree with that conclusion, I take it?

Guermeur: I sometimes encounter people who say, "It's just a keyboard. Why, I can spend $10 and buy one, and it looks better than yours!" I then ask them what's the most important object in their lives. They think about it, and respond that it's their iPhone or BlackBerry. Now, for me, the most important object in my life is the one I touch the most—and that's something we usually don't realize. Most of these people touch the keyboard eight hours a day. That becomes the de facto most important object in their lives. If you don't have a good keyboard, you will feel it in your fingers and will not be as efficient or productive. If you have a good keyboard, you type much faster and can do a lot more in eight hours.

CPU: What about some of the models out there that employ unusual designs purported to be ergonomically adapted to human use? For instance, the keyboard that splits into two separate halves angled out, or the curved keyboard. Have you ever considered producing anything like that in your line?

Guermeur: We looked at these keyboards, and we think there's a lot of marketing "play" going on using the ergonomics label. If you

Das Keyboard

have a keyboard in front of you, and put your fingers stretched out all the way over and across the home row, the keyboard doesn't appear designed to fit your hands. Your fingers are at a 45 degree angle. But when you curve your fingers to the home row, they form a straight line. The standard keyboard design is ergonomic.

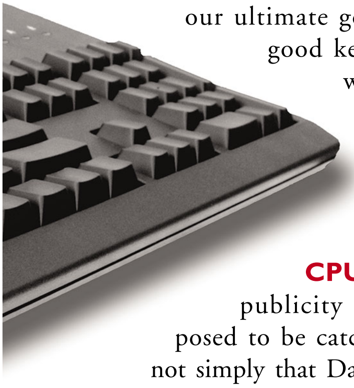
> We got thousands of orders, and we were not prepared. The only thing we had going at the time was our Web site, the one with the picture and the Buy button.
>
> —Daniel Guermeur

CPU: You also supply differently weighted key switches, requiring different levels of force for the keys. This actually ties in to ergonomics, doesn't it? Because the further you get from the center of the keyboard where your palms are, the more power your fingers can bring to bear by their angle.

Guermeur: It's a bit tricky, because some keys we all just slam—like the Spacebar or the BACKSPACE. All the keys where you input text, *A-Z*, *1-0*, those are "soft" keys on Das Keyboard, and the control keys, those are hit pretty hard.

CPU: Is the $129 price tag for Das Keyboard competitive with other high-end keyboards?

Guermeur: Yes. We try to sell it as cheaply as possible. Obviously we have to make some profit in order to keep manufacturing, but I think that, for me, our ultimate goal is to provide a good keyboard for people who need it. The price shouldn't be an issue, something that gets in the way.



CPU: I understand that publicity is, of course, supposed to be catchy, but yours says not simply that Das Keyboard is great but that "It's the best keyboard on the planet, period."

Guermeur: Yes.

CPU: Would you care to back up that statement?

Guermeur: When we started to design Das Keyboard, we spoke with a lot of people who had veteran experience with keyboards. Many of them used Selectrics, the IBM Model M. One sent us a keyboard from his garage that he loved so much he'd kept it for 20 years. We had it in-house and used it as a reference point. What I think makes Das Keyboard a little greater than its competition is all of this: a stylish design with a hub for your iPhone, etc. When you take into account that it has the best mechanical keys you can find, plus the design and functionality, then you end up with a great piece of art on your desk.

CPU: A great piece of art?

Guermeur: Yes. I have a keyboard picture in my office. It's a blank DOS keyboard on a pedestal, like a trophy. Looks really great.

CPU: You claim a life for the keyboard mechanism of 30 billion keystrokes. How do you measure this?

Guermeur: The key switches are put through automated tests. We know the number of keystrokes people can use before it stops working.

CPU: What's the average keystroke life on the standard keyboard out there that most people buy for $20 to $30?

Guermeur: It's 3 million to 5 million keystrokes. We measured it, too, because we have a lot of Dell keyboards that we get when we purchase our computers.

CPU: So, let's say that you write intensively, as most of us do these days. What does that figure, 3 million to 5 million, vs. 30 billion keystrokes, convert to, in terms of years of use?

Guermeur: It's a good question. You have 1,000 words on a page, and the average word is five characters, so 5,000 characters on one page. That translates into 1 million characters per year.

CPU: So the difference is between five years and decades?

Guermeur: Yes, and remember: If you use a poor keyboard and you are a writer, your fingers will go away before the keyboard.

CPU: I've also been meaning to ask you about the reference on your Web site to gold in the key switches.

Guermeur: Yes, the key switches are gold-plated because they are metal pieces. As you know, metal oxidizes all the time. To avoid oxidation, we use gold, so it keeps the proper contact.

CPU: So the use of gold in electronic and mechanical contacts is not just a gimmick used to sell a fancier device.

Guermeur: That's what goes first. After a few years, one key stops working, then another. You develop contact issues. But not with Das Keyboard!

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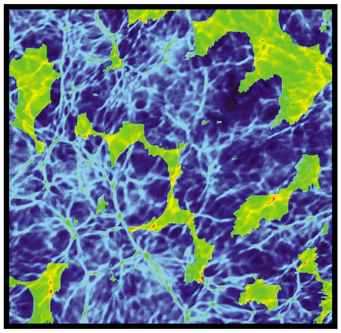


Tightly coupled mathematical equations in Daniel R. Reynolds' new software are helping astrophysicists envision a phase of early development of the universe called "cosmic reionization" in a fresh and more accurate way.

In most situations, "big bang" and "supercomputer" are terms you don't want to mention in the same breath. However, in the world of cosmology (the science studying the development of the universe), supercomputers work quite well exploring the Big Bang. And Daniel R. Reynolds, assistant professor of mathematics at SMU, has developed software for those supercomputers to smooth the path of the astrophysicists' research.

"For hundreds of years, scientists have used mathematical models (i.e. sets of equations) to describe the world around them," says Reynolds. "In fact, a key indicator of scientific progress is to look at how these models have evolved through time, growing increasingly accurate at predicting and explaining nature.

"In my work with my collaborators, we combine various mathematical models, each of which describes a different . . . relevant piece of physics, together to form a larger model in the hopes that the combined system of equations can be used to predict . . . the formation of galaxies, among other things."

Reynolds' work with a collection of California-based astrophysicists differs from others in the field in that his software closely couples a variety of computations that represent the physical processes that were theoretically happening in the beginning of our world. According to an SMU release, some of the "relevant pieces of physics" Reynolds mentions above include the chemical ionization of hydrogen and helium, heating of gases, transport of radiation, gravity, expansion of the universe, and the forces and movement of dark matter. By utilizing software that ties these computations together, the scientists believe that they have a much more precise model of what occurred.

"The real work comes in how to solve these equations to see what they predict," Reynolds says. Because the equations are so huge and complicated, only supercomputers can handle them, so the team is using supercomputers "Ranger" (University of Texas, Austin) and "Kraken" (University of Tennessee) to run Reynolds' program and test their computational theories. Ideally, the computations will reveal a universe that accurately evolves into one that mirrors our current one. ▲

Ambient Kitchen Serves Up Autonomy

Ah, to have the ease and convenience of the Jetsons' cartoon kitchen—where everything is magically concocted by machines and delivered by robot. Though the Jetsons fantasy is fun, there are those in our community who could seriously benefit from some widespread computerized assistance in the kitchen.

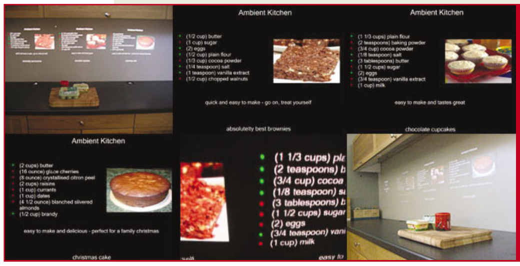
Dementia research done by Andrew Monk and Joe Wherton at the UK's University of York shows that people with the disease fare better when allowed autonomous decision-making in their lives, coupled with prompts to help them live successfully alone. To facilitate that goal, Patrick Olivier and his research team at Newcastle University are designing a kitchen loaded with a network of sensors, cameras, and displays, wirelessly linked together.

Dubbed the "Ambient Kitchen," the project seeks to make assistance seamless. Their kitchen is implanted with RFID readers, tags, and wireless sensors, called "motes," on every utensil, pot, pan, food product, and countertop. The floor is pressure-sensitive, and hidden cameras and projectors are scattered throughout the space.

When a user places ingredients on the cutting board, an 80-inch automated display along one workspace offers potential recipes and lists additional necessary ingredients, noting what ingredients are available (or not) in the kitchen. To select a dish, the user simply moves her cutting board in front of the desired recipe displayed; the kitchen then gives step-by-step instructions to prepare the dish. In addition, the kitchen will remind the user to take her medication and will only reset the reminder once the meds are removed from and returned to the cupboard.

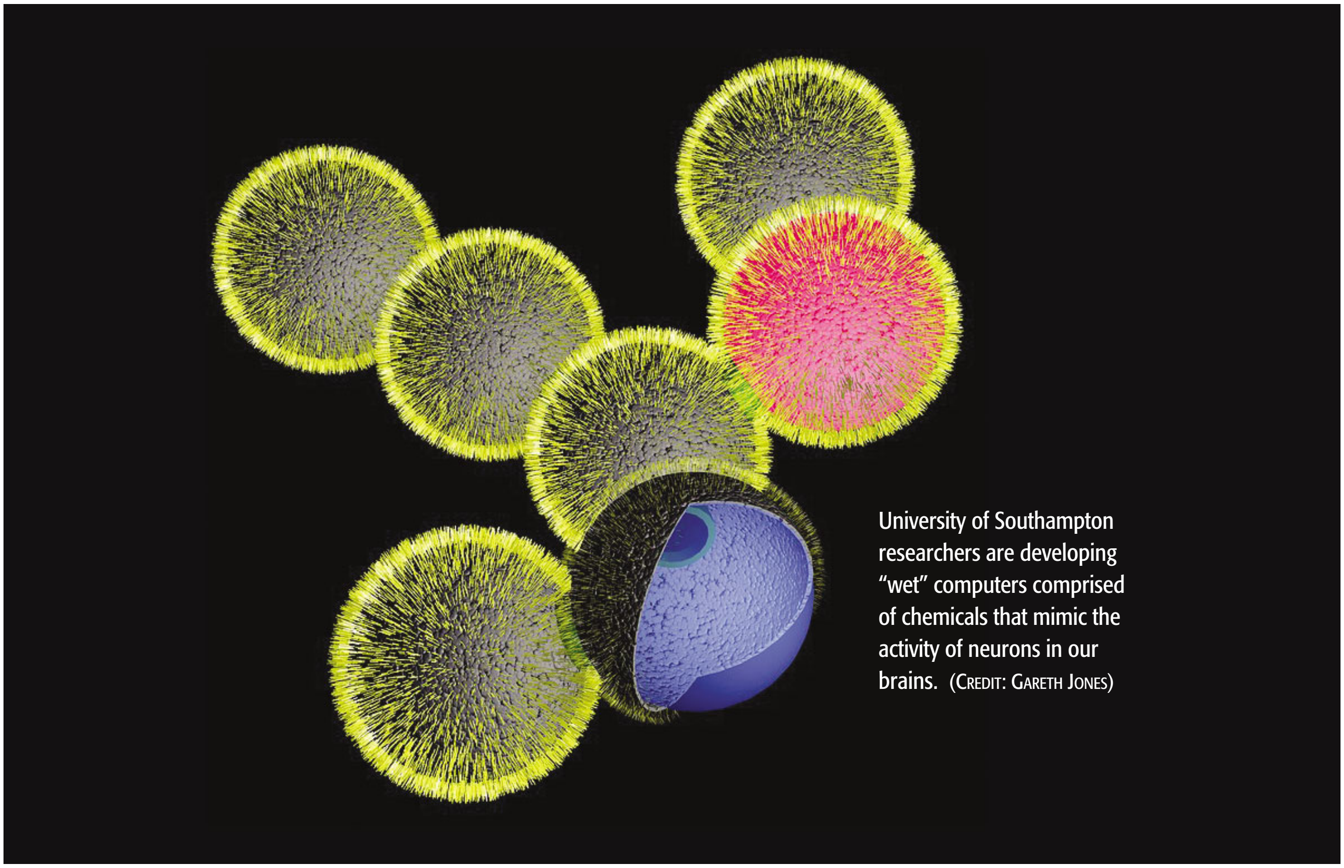
Olivier appreciates his team's breakthrough moments. "When all the technology disappears [and] the kitchen offers digital support, it seems magical," he says. His research associate, Thomas Ploetz, also discovered that they could accurately identify who was in the kitchen simply from motion data recorded while utensils were in use. "How you cut a carrot really is that unique!" Olivier enthuses.

Olivier hopes they can have the Ambient Kitchen available for the real world in around four years, but aspects of the project (such as activity recognition) may be available earlier. ▲



A team of researchers at Newcastle University have developed a kitchen embedded with pervasive computing to assist the elderly and those with dementia.

"Wet" Computers Look To The Brain For Modeling



University of Southampton researchers are developing "wet" computers comprised of chemicals that mimic the activity of neurons in our brains. (CREDIT: GARETH JONES)

When trying to accomplish the next leap in computing, researchers always seem to come back to the brain. Certainly the model in our head is the primary reference for Dr. Klaus-Peter Zauner and his colleagues at the University of Southampton in the UK as they take on the monumental task of constructing a "wet" computer.

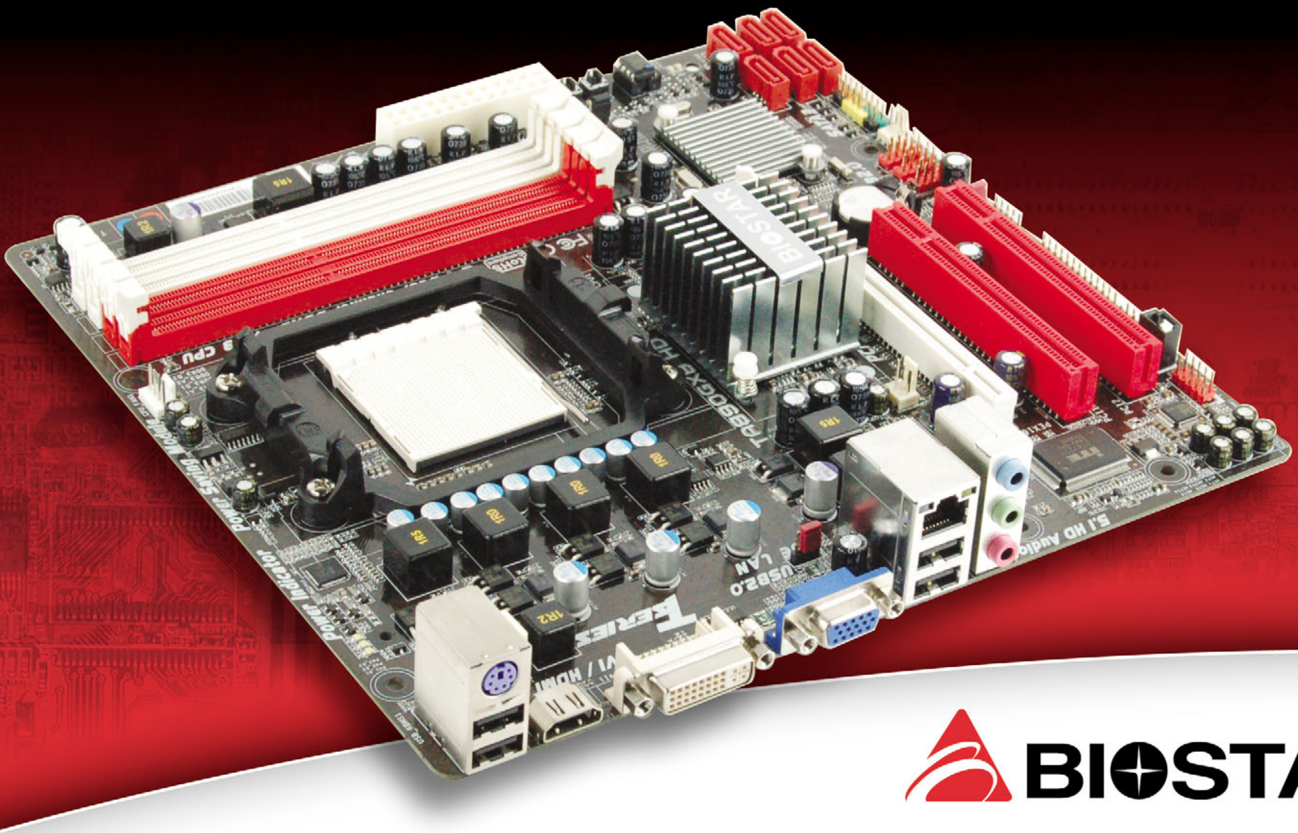
Wet computers, or those made of chemicals that imitate the workings of neurons in our brains, have many possible applications. In the field of synthetic biology, wet computers could help change bacteria that would create biofuels or gather solar energy. Wet computers could be used to develop "intelligent drugs" that can read a cell's chemical composition and take the appropriate action. Also, "wet computing is particularly suitable for small, [ant-sized] robots, because chemical energy, [which is very energy-efficient], can be used directly," says Zauner. Obviously, a wet computer is not raring to take over a typical computer's job, but instead work in environments that would be anathema for conventional computers' circuitry.

In theory, the workings of a chemical computer sound simple. "The hardware of the wet computer (the wetware) is very similar to salad dressing, Italian style," explains Zauner. "If you add a small amount of vinegar to olive oil and shake it, you will have small droplets of vinegar floating in the oil. Such water in oil droplets are the basic components of our computer. If you let the salad dressing stand for a bit, the droplets sink to the bottom and separate from the oil. To prevent this, we add lipids, which by themselves will insert at the surface of the droplets and coat the droplets." Because of the lipids, the droplets won't fuse [to each other], and with the addition of membrane proteins, the droplets gain contact points through which information can be shared from "cell" to "cell."

The structure of these cells could be considered the wiring and components of a typical computer, but as Zauner notes, they are not enough to "compute." What is needed is an electrical jolt of some sort—in this case, chemicals that leech through the pores, causing a chemical reaction not unlike a neuron firing in our brains.

For this jolt, the team is using a chemical reaction mixture called a "Belousov-Zhabotinsky medium," and that mixture allows for synaptic-like excitation and firing (thus, information exchange) to occur. This mixture, and the process it facilitates, can be compared approximately to transistors in a conventional computer, says Zauner. The team is not sure if it is possible to create software for the wet computer, at least in the way that we currently understand software to function.

As far as when we might see wet computers on the market, Zauner says, "This three-year project is basic research and will not lead to immediate applications." The team does hope to have a simple prototype in the next two years. ▲



BIOSTAR

Level Up With BIOSTAR

BIOSTAR's newest motherboard, the TA890GXB HD, represents the company's commitment to optimizing standard features and enhancing overall performance. Designed to support AMD's ACC (Advanced Clock Calibration) function, the TA890GXB HD BIO-unlocKING technology liberates extra cores, which means better performance for less money.

The AMD 890GX Chipset ships with ATI Radeon HD 4290 DX10.1 graphics and can accommodate up to four DIMMs (16GB) of DDR3-1600(OC)/1333/1066 memory. It supports Socket AM3 processors and AMD Phenom II/Athlon II processors (plus AMD multicore). The board also provides plenty of I/O and expansion options, including PCI-E 2.0 x16 and x1 slots, five SATA3 6Gbps connectors, four USB 2.0 ports and 3 USB 2.0 headers, and more.

Unlock The Potential

The BIOSTAR's TA890GXB HD steps up the board's core functionality by giving you simple, one-button access to unlocking an extra third or fourth core: During startup, pressing F3 unlocks the third core and F4 unlocks the fourth core. Both features automatically start the AMD chipset's ACC function (and you can activate each core separately); when the "CPU Level Up" logo appears, you've effectively engaged the additional cores.

Graphics Processing

Thanks to its onboard ATI Radeon HD 4290 graphics with 128MB of DDR3 side-port memory, the TA890GXB HD provides the graphics performance you need to run fast-paced FPS games, photo-editing software, and video playback. The board is also equipped with ATI's Hybrid CrossFireX technology, so you can add a discrete graphics card to its PCI Express 2.0 x16 slot, and it will work in tandem with the integrated HD 4290 graphics processor to deliver even more amazing visuals.

(BIO)Star Qualities

The TA890GXB HD is efficient and powerful; BIOSTAR's unique DPU (Digital Power Unit) and 3D (Digital Command, Digital Communication, and Digital Control) technologies dynamically regulate power current based on load, resulting in lower temperatures and CPU power efficiency gains as great as 15%. The board's GTO 6^3 (or GreaTurbo Overclock) feature combines support for AMD's newest six-core CPUs and the latest SATA 6Gbps storage interface with the ability to easily overclock its HD 4290 integrated graphics chip's frequency and voltage. The TA890GXB HD also features Rapid Switch onboard power-up and reset access for DIY testing as well as Tweak Tech, a PWM layout designed to provide stable power to the CPU and memory. ▲

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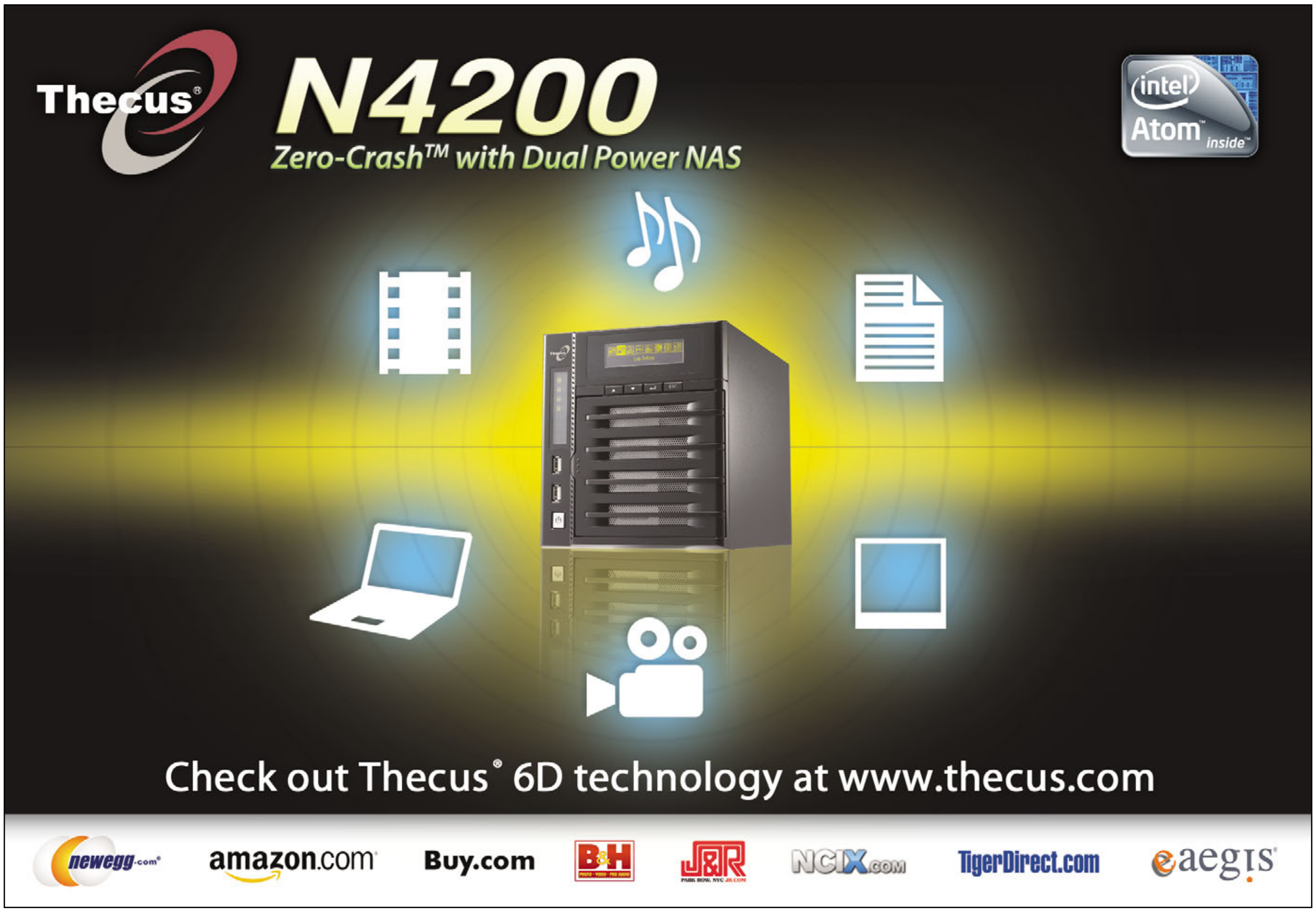

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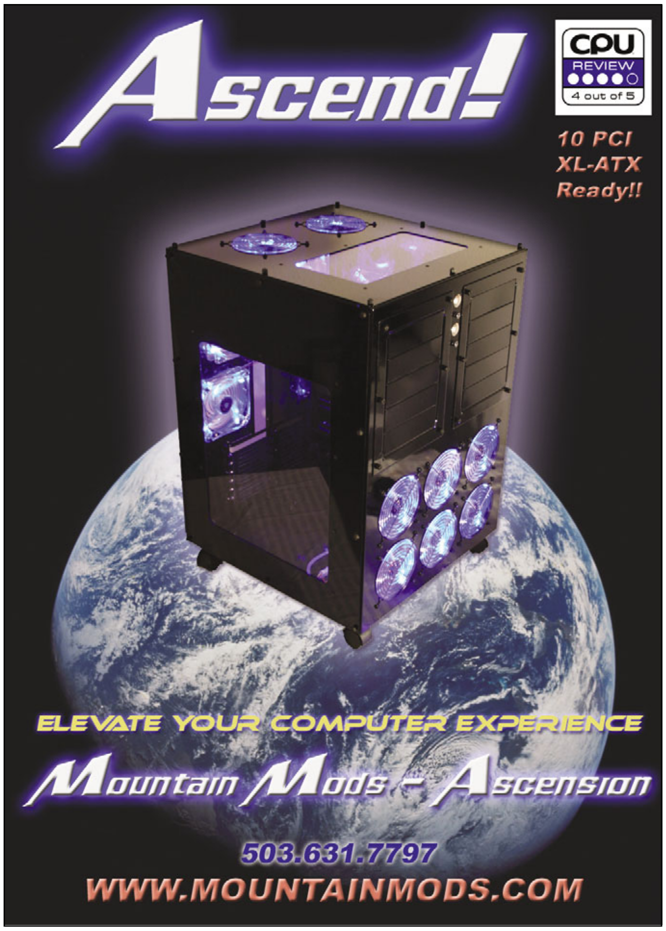

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FragFest X - Utica, NY
gamers.sunyit.edu

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East NC Gamers - Greenville, NC
games.groups.yahoo.com/group/EastNCGamers
LAN OC 6.0 - Ohio City, OH
lanoc.org
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NGC's LAN-A-GEDDON - Greenville, TX
www.networkgamingclub.com
OnTargetLan April 2010 - Hot Springs, AR
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Penn State Brandywine LAN - Media, PA
istclub.net
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Intel LAN Fest

A Tale Of Three Cities

The 2010 Intel LAN Fest season is officially in full effect, and *CPU* is on the road, scoping these events for superlative mods. If you're planning on attending a LAN Fest event and have a mod you think will make the grade, check out the LAN Fest Web site (lanfest.intel.com) for more information, and we'll see you there!

Intel LAN Fest Dallas

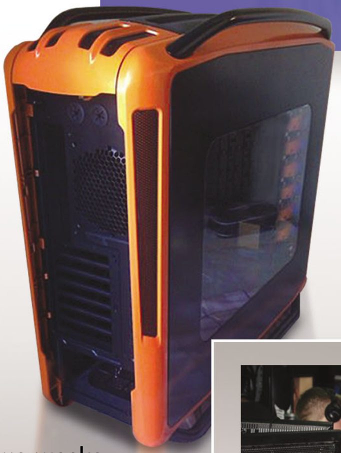
If you've been to many LANs in the Dallas, Texas area, you've probably crossed paths with Craig "Tech-Daddy" Tate. Tate's work has been featured in *CPU* before, and his mods never disappoint (check out "Lupine" on pages 36 and 37 of the December 2005 issue). We got to see his latest project, Deuce, on March 12 at Intel LAN Fest Dallas.

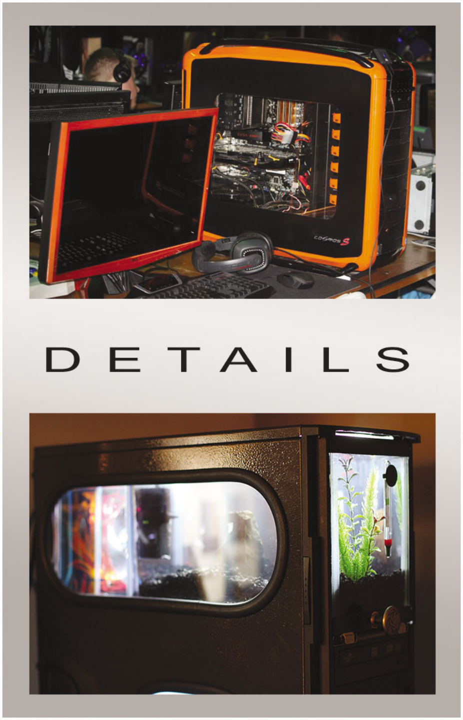
As its name suggests, Deuce is based on the concept of everything in pairs—two CPU cores, two video cards, two reservoirs and two cooling loops, etc. Tate extended the theme by giving the rig a paint job to match a Hot Wheels collectible 1949 Mercury Custom Coupe (check out his worklog at Modders-Inc.com, where Tate is a regular contributor). The chassis is based on Thermaltake's Armor, and everything about it screams "FAST!"

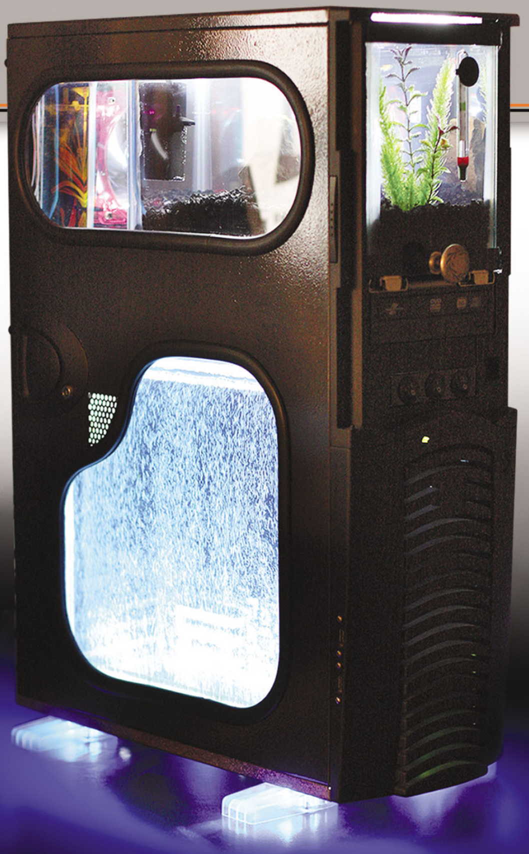
Intel LAN Fest Howie's SoCal

On February 27, *CPU* headed to a LAN at Howie's Game Shack in Mission Viejo, Calif., and while we were there, we bumped into Bobby Omari, one of the excellent volunteers who make Intel LAN Fest events possible. Omari showed up to the event loaded for bear with his beautiful, contest-winning orange and black machine, based on the classic Cooler Master Cosmos S.

Omari spent a couple days taking the chassis apart and two weeks more giving it the meticulous paint job shown here (yes, it had components in it during the LAN), designed to match the stock paint of his handsome Acer G24 monitor. Omari spent almost as much on paint ($200) as he did on the OC'd 3.2GHz Intel Core i7-920 at the heart of the mod, but as you can see, it was worth every penny.







Intel NW LAN Fest

Every time we head out to the Pacific Northwest, we know we can rely on finding two things: serious gaming and serious mods. Thanks to Jason Rust and his outstanding Fish Tank mod, our March 12 trip to Intel's Aloha campus in Aloha, Ore., for Intel NW LAN Fest 2010 was no exception.

Rust says he's been gunning for coverage in *CPU* since he started the project; it's obvious he's been paying attention, because this mod pushes all our buttons. It's a radical refit of the original Chieftec case Rust started with, but his work is so meticulous that you'd be forgiven for wondering if Chieftec built it with a fish tank inside to begin with. We love the way Rust blended function with form; the 2.5-gallon fish tank in the upper portion of the case is attached via drawer slides, so he can pull it out smooth as butter, feed his fish, and close it up. The bubble wall in the lower section completes the look, giving the case the appearance of being totally submerged. For more pics and Rust's worklog, head to www.computerfish.blogspot.com.

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Q&A With Amit Yoran

DHS' First National Cyber Security Division Director On Fighting Bad Guys Online

Originally part of the Department of Defense's CERT (Computer Emergency Response Team), Amit Yoran was the first director of the Department of Homeland Security's National Cyber Security Division. Today, Yoran is the founder and CEO of security analysis and services firm NetWitness. Few people have his deep grasp of cyber threats in the public and private sectors and understand just what our risk level is, individually and as a nation.

Q **You recently testified before Congress that "our adversaries continue to aggressively press their advantage in cyber space." Who are these adversaries and what advantage do they possess?**

AY Our adversaries really boil down into two distinct threat categories. In 2009, the FBI stated that over 100 nations have offensive cyber capability as part of their intelligence and national security infrastructure. Also in 2009, more money was made by organized crime online than was made in drug trafficking. The same things that make cybercrime very attractive to organized crime make it attractive to covert operations in the foreign intelligence services. There's very little cost to mount a cyber campaign. You don't have to step foot in somebody's facility or sovereign territory and become subject to their domestic espionage or criminal statutes. So for a wide variety of reasons, cybercrime becomes a very attractive domain for both criminals and nation-states to operate in.

Q **Do you feel mainstream security products and the support behind them are sufficient to meet today's current threat trends?**

AY I think nothing could be further from today's reality. All of the general-purpose protective methods that the IT industry has relied on to evaluate its security and to protect its information from breaches have been proven ineffective. We can't even rely on the telemetry they provide back to us. Just because your antivirus product isn't alarming you doesn't mean you haven't already been compromised. The attackers have a level of technical sophistication able to bypass or invade these monitoring practices, which ultimately only look for the known, previously observed "bad activities." As long as that remains the paradigm for protecting IT systems, we will continue to be increasingly compromised and have data lost, stolen, or modified, and we may not even know it happened until years later.

Q **Are there government-organized hostilities being carried out against the United States in the cyber world, or are these just bands of individuals?**

AY Both. There are nations that actively or aggressively use cyber means to conduct espionage activities against the U.S. government and also against key economic interests in the United States. The same is true of organized criminal activities going after information or financial gain which can be obtained by attacking commercial and government targets in the U.S. and abroad.

Q **So, are we in a state of cyber war?**

AY There is a high volume of cyber threats and attacks, but I'm cautious to use phrases like "cyber war" and "cyber terrorism." When you do, you not only have a strong emotional connotation, but it also brings in a certain legal frame of reference—Title 10, the Department of Defense, and other constructs that may not make sense for a lot of cyber activities.

Q **You're saying, "Don't make the problem bigger than it is, otherwise you might wind up losing some of the liberties you currently enjoy."**

AY Exactly. If everyone believes that's the right term and frame of reference—a "cyber war"— then perhaps they will believe that the DoD is the best way for the United States to protect itself. I don't believe that's the best outcome for us.

Q **Is there anything that the average person can do to fight back against these threats?**

AY Fight back? No, not legally. Get better at protecting yourself? Yes. Keep your system offline when you don't need it. Keep your sensitive data offline when you don't need it. Make sure you're patched and up-to-date. . . . If you do these things, you lower your profile significantly.

Can you keep yourself truly protected? I think that's a lot more difficult than people realize. ▲

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